Digital Sound and Music

`http://www.wam.umd.edu/~toh/adulted/SoundandMusic/`

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Tentative Time Schedule (half-day format)

First hour   Demonstration of basic recording with Windows *Sound Recorder*; playing back digital sound (B1-3), using sounds on Web pages (B10-11). Free time to work on hands-on activities.

Second hour   Demonstration of advanced sound editing using *Audacity* (C1); ripping and burning audio CDs and MP3 discs (B6). Free time to work on hands-on activities.

Third hour   Demonstration of computer music activities (B7, B9) and video/audio slide shows (D1). Free time to work on hands-on activities.

List of Handouts

Contents of the Workshop CD-ROM (Version 12)

Step-by-step activities

1. **How to install the software**. How to install all the software needed for the workshop activities.

2. **Recording and Writing Audio CDs using *MusicMatch***. How to copy songs from an audio CD. How to burn a custom audio CD from your previously-copied music tracks.

3. **Recording and burning with Windows Media Player 8**. How to record and burn audio CDs with Windows Media Player 8.

4. **Recording and burning with Windows Media Player 10**. How to record and burn audio CDs with Windows Media Player 10.

5. **Recording sound with your computer's microphone input**. Connecting and adjusting a microphone for recording spoken comments. Checking the sound settings. Making high-quality recordings with *Audacity*.

6. **Mixing and blending Music with *Audacity***. Combining songs into a continuous medley; Adding a vocal track (singing or spoken commentary) to a music file.

7. **Converting records to audio CDs**. How to convert vinyl records and tapes into audio CDs.

8. **Cleaning up**. Reducing Noise in Old Vinyl Disk and Tape Recordings

9. **How to open sound files**. How to Open and Listen to Sound Files.

10. **Playback and Downloading**. Playing back sound on your computer. Downloading sounds from Web pages. Recording Internet radio stations and other computer-generated audio.

11. **Buying Music Online**. Buying music online: CDs via mail order; Digital Music Services.

12. **Computer Music Activities**. Computer music activities: you don't have to be a musician to have fun with music. Arranging MIDI songs using Sweet MIDI Player. Computer Karaoke.

13. **SoundAnd Music**. Combined step-by-step workshop activities handout: copying songs from an audio CD onto your hard disk in compressed MP3 format; creating custom audio and MP3 CDs; using and adjusting a microphone; checking the sound settings; recording live sounds; recording from tape and record players; downloading sounds from the Internet; playing sounds using a computer sound player; putting sounds on Web pages; arranging MIDI songs; computer karaoke. There is also an **alternative version of this handout** organized for teacher workshops.

14. **MemoriesOnTV**: *Memories On TV* is a commercial ($50) program that you can use to make professional-quality Ken Burns-type documentary video slide shows of digital pictures with background music and narration that can be played on a DVD player. (WordPad or MS Word document). The CD-ROM contains a fully-functional evaluation version of this software and two short examples of home-made video slide shows made with *Memories On TV* and *Audacity*: Snails, a science piece about snails, and In the Realms of the Unreal, about reclusive visionary artist and writer Henry Darger.

Additional Information Handouts

15. **Kinds of Compact Disks and Players**. Kinds of Music Disks and Players: A brief explanation of several different types of Music Disks and Players. (PDF document) .

16. **The Different Kinds of Disks**. Comparison of CD-ROM, CD-R, CD-RW, audio CD, DVD, and other types of disks computer use. (WordPad or MS Word document)

17.**AutoPlay**. How to control what happens when you insert a CD into your computer's CD-ROM drive. (WordPad or MS Word document)

18.**Home Theater**. Setting up a low-cost home theater system for movies and music: DVD player, television set, speakers, how to hook it up. (WordPad or MS Word document)

19.**Programs**. Types of Sound and Music Programs. A brief explanation of several different types of programs used in working with computer sound and music. (WordPad or MS Word document)

20.**Formats**. Sound and Music File Formats. A description of the different sound-based and note-based file formats commonly used for computer sond and music. (WordPad or MS Word document) For some examples of these different formats, see **Sound file examples** and **Other MIDI examples**.

21.**Compare**. Six different ways to represent 50 seconds of music as a computer file. (WordPad or MS Word document) An example of a short piece of music (J. S. Bach's Two Part Invention, #8), in several different sound-based and note-based file formats.

Software

22.**Windows software**: A folder containing freeware, shareware, and demo software for sound and music applications for Windows computers. See the **ReadMe** file in that folder for a description of each program. See **How to install the software.rtf** for installation instructions.

23.**Mac software**: A folder containing freeware, shareware, and demo software for sound and music applications for Macintosh computers.

24.**Sound visualization programs**. A folder containing software for sound and music visualization, for PC and Mac.

Sound and music data files

25.**Sound file examples**, **Other MIDI examples**, and **Karaoke examples**. Folders containing examples of sound and music files in various formats.

26.**Bird Songs**. A folder containing a small collection of bird calls in WAV format, plus some shortcuts to Web sites with more bird information.

27.**Old Records**. A folder containing original (unfiltered) digital recording of old vinyl records created using three different recording programs (MusicMatch, Cool Edit, and Analog Recorder) and saved in three different sound file formats (MP3, WAV, and WMA), for use in practicing noise removal techniques. See the handout **"Reducing Noise in Old Vinyl Disk and Tape Recordings"** for instructions.

Classroom Project Handouts

28.**TalkingBack**. Talking Back(wards): test your pronunciation accuracy.

29.**ABC**. Step-by-step procedure for completing the Audible Alphabet Book project.

30.**PPoint**. Adding music, sounds, and videos to Powerpoint presentations. How to inset an audio CD track onto a slide. How to record a voice narration into a slide show.

31.**Analyzing**. Do Birds Sing in Tune? Visualizing and Analyzing sounds, a step-by-step activity involving visualizing and analyzing bird calls using the *Audacity* program (Science, math, multiple representations, graphing).

Sample Projects and Web sites

32.**Sound and music Web sites**. A folder containing a collection of over 300 Internet shortcuts (links) to

Web sites related to sound and music, examples of student projects, tutorials, and other useful ideas, including Royalty-Free Music files to download, Digital Music Services, PowerPoint sound, Greeting Cards with voice message, Downloadable sound and music files, Technology and software, Technology and software, Music education, Musical instruments, How sound works, Animal sounds, Sing-along and Karaoke, Speech recognition, and Text-to-speech.

33. **Web templates with sound**. A folder containing three templates for constructing Web sites with sounds on each page. See the **ReadMe** file in that folder for a description of each template. (Detailed instructions for each template are in the ReadMe files within each folder).

34. **Slide Show Idea Sampler**. A small Web site on the workshop CD-ROM illustrating some possible multimedia projects involving sound, based on the "Slide Show Template with sound" template.

35. *Example Projects* **on this CD-ROM**. A collection of multimedia projects including recorded sound, created by students and teachers. Includes **Famous Americans Biography Book Reports**, **Electronic Self-portraiture**, **"Old Yeller" Slide Shows**, *The Double Life of Pocahontas* **by Jean Fritz** from Fairland Elementary in Montgomery County, MD, **Jessica's multimedia poem** (Quicktime movie) from Neolani School's **Move over Beethoven** project.

36. **Maryland ABC book** and **Florida ABC book**: Two partially-completed alphabet-book Web sites, based on the "Alphabet book template with sound", that are for you to complete by recording spoken comments for each letter. See instructions in **ABC.doc**.

37. **Powerpoint Examples** folder. **Sounds in PowerPoint Presentation**, a simple Powerpoint presentation that plays WAV, MIDI, and audio CD tracks; **How to play sounds across multiple Powerpoint slides** demonstrates how to keep a sound (like background music) playing over several Powerpoint slides.

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Installing Software used in the Digital Sound and Music Workshop

Updating Windows Media Player (Media player, CD recorder and burner)

1. Connect to the Internet and launch *Windows Media Player* (**Start => Programs => Accessories => Entertainment => Windows Media Player)**.
2. Click **Help => Check for Player Updates**. Follow the instructions on the screen.

Note: If your computer uses Windows XP, you should update to *Window Media Player 10*, which can copy audio CDs into MP3 format (older version copy only to WMA format).

Installing *Audacity* (Free sound recorder/editor, versions for PC or Mac)

1. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive.
2. Open **My Computer => CD Drive =>Windows Software => Audacity=> audacity-win-1.2.4b.exe**. Alternatively, go to http://audacity.sourceforge.net/ and download the latest version. Note: there is also a Macintosh version of Audacity in the Mac Software folder.
3. Click **Next**, **I accept the agreement**, **Next**, **Next**, **Next**, **Next**, **Install**.
4. Open **My Computer => CD Drive =>Windows Software => Audacity** and copy **lame_enc.dll** to the Audacity program folder (**My Computer => Local Disk (C:) => Programs Files => Audacity**). (This step is necessary if you wish to save mp3 files).

Installing *MusicMatch* (CD recorder that converts songs to MP3 files)

1. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive. Open (double-click or right-click and select **Open**) **My Computer => CD Drive =>Windows Software => MusicMatch CD Recorder => mmsetup**.
2. On the "Welcome" screen, click **Next**.
3. On the next screen, click **Yes**.
4. On the "User Registration" screen, fill in your year of birth, email, and country (it need not be your real email address).
5. On the "Personal music recommendations" screen, click **No** and then click **Next.**
6. On the "Install Options" screen, click **Custom** and then **Next**.
7. On the "Choose installation location" screen, click **Next**.
8. On the "Choose music folder location" screen, click **Next**.
9. On the "Setup radio cache" screen, click **No** and then **Next**.
10. On the "Select Program Folder" screen, click **Next**.
11. On the "MUSICMATCH shortcuts" screen, click **Next**.
12. On the "Filetype Registration" screen, *un-check all the boxes* and then click **Next**.
13. On the "Setup complete" screen, un-check "Run MusicMatch".
14. Close all the open windows.
15. To run *MusicMatch*, right-click on the **MusicMatch JUKEBOX** icon on the desktop, or click **Start => Programs => MusicMatch =>MusicMatch Jukebox**..

Installing *WinKaraoke* (computer karaoke player). Windows only

1. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive. Open (double-click or right-click and select **Open) My Computer => CD Drive =>Windows**

Software => **WinKaraoke program** => **setup.exe**.

2. On the next screen, click **OK**.
3. Click the big square button with the picture of a computer on it.
4. Click **Continue**
5. Click **Yes**.
6. Click **OK**. The installation will complete.
7. This step copies the Karaoke example files on the CD to the WinKaraoke program folder, so you can play these karaoke files without having the CD in the computer. Open **My Computer** => **CD Drive** => **Karaoke examples**. Click **Edit** => **Select All**. If your computer has Windows XP, click "Copy the selected items" under File and Folder Tasks on the left, then in the **Copy Items** box navigate to **C:** => **Program Files** => **Winkaraoke Player 1.5**, then click **Copy**. If you are *not* using Windows XP, you will have to drag and drop the karaoke example files from the CD into **C:** => **Program Files** => **WinKaraoke Player 1.5.**
8. To run *WINKaraoke Player*, click **Start** => **Programs** => **WinKaraoke Player 1.5** =>**WinKaraoke Player 1.5**.

Installing *Sweet MIDI Player* (MIDI player and editor for PC and Mac)

1. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive. Open (double-click or right-click and select **Open) My Computer** => **CD Drive** =>**Windows Software**.
2. Drag the "Sweet MIDI Player" folder to your desktop.
3. To run *Sweet MIDI Player*, open the "Sweet MIDI Player" folder and open "Swmipl32.exe".

Installing *CoolEdit* (alternative sound recorder/editor) Windows only

1. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive. Open (double-click or right-click and select **Open**) **My Computer** => **CD Drive** =>**Windows Software** => **CoolEdit sound editor installer** => **c96setup**.
2. On the "Welcome" screen, click **OK**.
3. On the "Select directory" screen, click **OK**. (If you get an error message, click **Ignore)**.
4. On the "Audio file associations" screen, click **No**.
5. On the "Peak file..." screen, click **No**.
6. On the "Temporary directory" screen, click **OK**.
7. On the "Start menu" screen, click **Add**.
8. On the "Run now?" screen, click **No.**
9. Close all the open windows.
10. To run *CoolEdit*, click **Start** => **Programs** => **Syntrilliuim** =>**Cool Edit 96**.

Note: You only need to install these programs *once*, for each computer you want them on. After the are installed, you can use them without re-installing. Once these programs are installed, you do not need to have the *Digital Sound and Music* CD-ROM in the computer to run the programs, unless you want to open one of the sound files on that disk.

Recording sound with your computer's microphone input

a. Connecting and adjusting a microphone for recording spoken comments.

1. For recording voice, use a headset with an attached microphone, rather than a separate hand-held microphone. This type of headset leaves your hands free and keeps the microphone at a fixed distance from the mouth. Position the microphone to the *side of the mouth*, **not** in front. (This will avoid pops and other noises caused by some consonants). For recording group singing or instrumental music, use a stereo microphone like the Radio Shack 33-3028, $30.

2. The headset has two plugs, one for the microphone and one for the headphones. Plug in the microphone plug into the microphone jack on the computer. Plug in the headphone plug into the speaker or headphone jack on the computer. Usually the plugs and jacks are labeled with a picture or a word to indicate their function. Ignore the colors of the plugs and jacks - different manufacturers use different color coding schemes.

b. Check the sound settings.

1. Double-click on the volume control (little loudspeaker icon) in the taskbar on the lower right corner of the screen. This displays the master volume control panel.

2. Make sure that none of the Mute boxes are checked and that none of the volume controls are turned all the way down (set the sliders about half-way up to start with - you can always change this later).

3. Select **Options => Properties** and click on **Recording** and click **OK**. Then make sure the **Select** check-box is checked under "Microphone" (it may be called "Mic.").

4. If your computer has an **Advanced** button below "Microphone", click on it and make sure that the **Mic Gain** box is checked. Close all the windows.

c. Simple method for recording short soundbites, using the Windows *Sound Recorder*:

1. Create a folder on the desktop to save your sounds in:

   1. Right-click on the desktop.
   2. Select **New => Folder**.
   3. Type "Sounds" and press Enter.

2. Select **Start => Programs => Accessories => Entertainment => Sound Recorder**.

3. Click on the **round red button** to begin recording. Click on the **black square button** to stop. Click on the **black triangle** to hear what you have recorded.

4. If you are satisfied, skip to step 5. If not, Select **File => New,** click **No**, and repeat step 3.

5. Select **File => Save**, navigate to the "Sounds" folder on the desktop, type in the file name "test1" into the File Name box, and click **Save**.

6. Select **File => New** to clear the old sound and repeat steps 3 - 5 to record another sound, giving it the file name "test2". Close *Sound Recorder* when you are finished.

d. Making high-quality recordings in MP3 format with *Audacity*.

1. If *Audacity* is not already installed on your computer, refer to the handout **A5**: "How to

Install Software used in the Digital Sound and Music Workshop" for instructions.

2. Launch *Audacity*. (**Start => All Programs => Audacity**).

3. Select **Edit => Preferences**. Click on the **Audio I/O** tab at the top. Under **Recording**, select Channels: "**1 (Mono)**". Then click the **Quality** tab and select Default sample rate **22050 Hz**, default Sample format 32-bit float and click **OK**. (If recording music using a stereo microphone, use "**2 (Stereo)**"and a sample rate of **44100 Hz)**. Click **OK**.

4. Click the **round red** button to begin recording, click the **square** button to stop, and click the **green triangle** button to play what you have recorded.

5. If you don't like what you have recorded, you can delete it by clicking on the close box [x] in the *upper left corner* of the waveform window, then repeat step 4.

6. **Adjusting volume**. You can adjust the volume of the track by dragging the slider at the left-hand end of the track (with the - and + at the ends). If the recording is really faint, select the entire waveform (type **Ctrl-A**), then click **Effect => Normalize** and click **OK**).

7. **Editing**. To delete sections of the sound file that you don't want, drag the mouse pointer over that portion of the waveform and press the **Delete** key. To hear just one section of the sound file, drag the mouse pointer over that portion of the waveform and click the **Play** button. You can also **Cut**, **Copy**, and **Paste** sections of the sound waveform.

8. **Adding background music**. While the voice waveform is still showing on the screen, you can pull down **Project => Import Audio...** and navigate to a song file (in WAV or MP3 format) that you want to use as background music. (For example, look on the CD drive for the folder named "Royalty-free music"). Click on the desired sound file and click **Open**. Click the **green triangle** button to play. (All tracks displayed on the screen play simultaneously). If the music is too loud, adjust the volume of the music track by dragging the slider at the left-hand end of that track (with the - and + at the ends). You can adjust volume while it plays.

9. **Saving**. To save the sound file as an MP3 file, select **File => Export as MP3...** , navigate to the desired save location (e.g. the "Sounds" folder on the desktop), type in a file name into the File name box, and click **Save**. Click **OK** on the "Edit ID3 tag..." box.

   Note 1: The *first time* you save an MP3 file, *Audacity* will ask if you want to locate the MP3 encoder. Click **Yes**, navigate to **My Computer => Local Disk (C:) => Programs Files => Audacity.** Click once on **lame_enc.dll** and click the **Open** button.

   Note 2: The resulting MP3 file can be used just like any other MP3 file; it can be added to a *Powerpoint* presentation, used on a Web page, added to a *Memories on TV* video slide show (see handout **D1**: **MemoriesOnTV3**), or included on a custom audio CD (see handout **B6: Recording and Writing Audio CDs ....**).

10. To save the entire *Audacity* screen with all the separate tracks, select **File => Save Project**. Give it a name and click **Save**. You can open the project file later in *Audacity* and continue working on the project. Close *Audacity* when you are finished.

How to Open and Listen to Sound Files

WAV (.wav), MP3 (.mp3), WMA (.wma), MIDI (.mid), AU (.au), or AIFF (.aif) files

Double-clicking on the file: If you *don't care* what program the computer uses.

Open the folder containing the sound file and double-click on the file (or right-click and select **Open**). That will let the computer choose the program. This might be *Windows Media Player* or it might be some other program that you have installed, such as *MusicMatch*.

If double-clicking the file opens the wrong program, or displays an error message:

1. Right-click on the file and select **Open with...**, then select **Choose Program...**.

2. Look through the list and select one of the programs.

3. Click the little box that says "Always use the selected program to open this kind of file".

4. Then click **OK**. Thereafter, double-clicking on files of that type will open the selected program.

(In *Windows 98,* Click **Start => Settings => Folder Options**. Click on the **File Types** tab. This lists all the file types that are registered on your computer and the programs that will be launched when you double-click a file of that type. To change an assignment, select the file type and click **Edit.**

If you want to open the file in a specific program, you can either:

A. Open the desired program first (**Start => Programs**), then pull down the **File** menu within that program, click in the "Look in" menu at the top, click on the file and click **Open**.
OR
B. Right-click on the file, select **Open with...**., select a program to open the file from the menu.
OR
C. If the desired program is already open, open the folder containing the file and drag the file onto the window of the program. (This will work in most but not all programs). In some programs (e.g., *Windows Media Player*, *MusicMatch*, *WinAmp*) you can even drag a whole folder of sound files onto a program window and they will all be listed in the playlist of that program.

If the desired program is not one of the choices in the "Open with..." pop-up menu:

1. Right-click on the file and select **Open with...**, then select **Choose Program...**. This displays a scrolling list of programs that could possibly open that type of file.

2. Look through the list and select one of the programs. If always want that program to open files of that type, click "Always use the selected program to open this kind of file". Then click **OK**.

3. The selected program will be launched and the file will be opened.

If I recorded a sound with *Sound Recorder* or some other program, won't that program be opened when I double-click the file?

No. *Sound Recorder* and other sound editors programs can save its files in generic sound file formats (e.g. .wav or .mp3). When you double-click on a file it recorded, the computer launches whatever program is assigned to .wav or .mp3 files (might be *Windows Media Player*, or *MusicMatch*, or some other program).

Why does *MusicMatch* open when I double-click on a sound file?

Because if not installed properly, *MusicMatch* takes over the file type assignments of several common file types. To fix that, follow the steps in "**If double-clicking the file opens the wrong program**" above**.**

Downloading and playing back sound on your computer

1. Once you have recorded a sound and saved it as a file, you can play it on any computer; you don't need the program that you initially used to create the sound file. Sound files are generic file types, not associated with any one particular program. To play sound files directly on any computer, in most cases you can just double-click on a sound file and let the computer decide which sound player program to use. All contemporary computers come with a built-in sound player program that will handle all common sound file formats.

2. On most Windows computer, *Windows Media Player* is the default sound player. However, you can force another sound player program to play a sound by opening the desired program first (**Start => Programs =>** and select the desired program), then pull down the **File** menu within that program, click in the "Look in" menu at the top and open the desired file (or folder or disk containing the file). In Windows XP and 2000, you can right-click on the file and select **Open with...**. Select a program to open the file from the pop-up menu.

   If the desired program is already open, open the folder containing the sound file and drag the file onto the window of the program.

   To *edit* a sound file, as opposed to simply playing it, you'll have to open it in a suitable editor program (e.g. *Audacity* for WAV, AU, or AIFF files, *Sweet MIDI player* for MIDI files, or *Finale Allegro* for ETF or other music notation files). See handout **F3** "Formats.doc" for more information.

3. Open the folder "Sound file examples" on the workshop CD-ROM and select **Details** from the **View** menu so you can see the entire file name, file type, and size of the file. Try playing some of the wav, au, aiff, and mid files by double-clicking on them. This will let the computer decide which sound player program to use to play the sound. Notice which sound player application is launched for each file type; this will vary depending on how the computers are set up. Some of the files can't be played by double-clicking on them because you have not yet installed the software required. When you are finished listening to these files, close all programs.

4. You may find it easier to work with sound files if you set up your computer so you can see the *file extension* (the three letter after the dot in the complete file name) of the files. The file extension tells you (and the computer) what type of file it is. Select **Start => Settings => Folder Options**. (In Windows XP, **Start => Settings => Control Panel => Folder Options**) Click on the **View** tab. Make sure that "Hide file extensions for known file types" is *not* checked. If it is, click it to un-check it. Click the **Reset All Folders** button and close the Folder Options window.

5. Many sound player applications, such as *Windows Media Player*, *WinAmp*, and *MusicMatch*, have *playlist* capability. A *playlist* is a list of songs that the computer will play automatically one after another, like a jukebox. You can easily create, save, and load playlists of your favorite songs, songs for parties or for particular holidays, etc. For example, in *MusicMatch*, you create a playlist by dragging songs onto *MusicMatch's* window, save the by clicking **Save**, open them by clicking **Open** then **Playlist**. A playlist can have any number of songs in it - you can easily create a playlist that will literally play all day and night. Note: Playlists do not actually contain the music files; they are just pointers to them; if you move or rename the music files or folders, the playlists will not work.

6. To play music loud enough to fill a room, you'll want decent speakers hooked to your computer: a good choice is a powered three-way computer speaker system that has a sub-woofer (for bass sounds) in addition to small left and right side speakers. *Altec Lansing* among other manufacturers make speaker sets that sound great and that cost as little as $20 - $40. Well worth the cost.

Downloading sounds from Web pages

Downloading sounds and music from Web sites is easy. The folder "Sound and Music Web sites" on the Workshop CD-ROM contains many examples of Web sites that have downloadable sounds

and music; look especially at the "Downloadable sound and music files" and "Sing-along and Karaoke" folders. Downloading is easy if the Web page has a direct link to a sound file. Links are usually blue underlined text (or perhaps a graphic icon) - you can tell it's a link to a sound file if, when you "mouse over" it, it displays a sound file type (ending in .wav, .aif, .mp3, .au, .mid, or .kar) in the bottom border of the browser window. Here how to download the sound file to you hard disk:

1. Right-click on the link and select "**Save Target As...**" from the pop-up menu.
2. Click in the "Save in" menu and select the location where you want to save the file.
3. Click **Save**.

A sound that you have downloaded is just like any other sound file - it can be played, added to a playlist, edited, burned to a CD, etc.

You can search for sound and music files yourself, using a search engine. For example, open your Web browser, type **google.com** in the address bar, and press the enter key. Type in a search term and click "Google Search" button. Try adding wav or MP3 or mid to your search terms to narrow down the search to files of that type. Or you can try **altavista.com** (click the **MP3/audio** tab) or **alltheweb.com** (click the **audio** tab). You can also find the lyrics to many songs online; just do a Google search for "lyrics" and any phrase in the song in quotes: e.g. lyrics "chevy to the levee".

Recording the audio output of other computer programs

You can use *Audacity* to record the audio output of other computer programs, such as MIDI players (section **B7**), Karaoke players (**B7-8**), Internet radio stations (e.g. pandora.com), and Web sites that use "streaming" audio. The trick is to run both programs at the same time and to use your sound card's mixer function:

1. Double-click on the volume control (little loudspeaker icon) in the lower right corner of the screen.
2. Select **Options => Properties** and click on **Recording** and click **OK**. Then make sure the **Select** checkbox is checked under "Mixer" (it may be called "Mix." or "Stereo Mix.") and make sure that its volume is turned up.
3. Launch *Audacity*. (**Start => All Programs => Audacity**).
4. Select **Edit** => **Preferences**, select "**2 (Stereo)"** under Recording/Channels. Then click the **Quality** tab and select Default sample rate **44100 Hz**, default Sample format 32-bit float and click **OK**.
5. Launch the program that generates the sound.
6. Click *Audacity's* **round red** button to begin recording. Start the sound or music from the other program. When the song has finished, press the **square** button in *Audacity* to stop recording.
7. If you don't like what you have recorded, you can delete it by clicking on the close box [x] in the *upper left corner* of *Audacity's* waveform window, then repeat step 5.
8. To delete sections of the sound file that you don't want, drag the mouse pointer over that portion of the waveform and press the **Delete** key. To hear just one section of the sound file, drag the mouse pointer over that portion of the waveform and click the **Play** button. You can also **Cut**, **Copy**, and **Paste** sections of a sound file just like a text file.
9. In order to compensate for differences in the volume (loudness) of several successive recordings, it's useful to use to "normalize" the waveform before saving each sound: select the entire waveform (type **Ctrl-A**), then click **Effect** => **Normalize** and click **OK**)
10. To save the sound file, select **File => Export as MP3...** , type in a file name into the File name box, and click **Save**. Files recorded in the **stereo, 44100** Hz settings will be able to be burned onto an audio CD: see handout page **B6**.

Copying and burning audio CDs using *Windows Media Player 10*

Copying audio CDs to your computer's hard drive ("ripping")

1. Dial up or connect to your Internet connection and then minimize your Internet software. This is done to allow the automatic CD lookup to function. Otherwise the proper artist, album, and track names will not be automatically applied.

2. Open *Windows Media Player 10* (**Start => Programs => Accessories => Entertainment => Windows Media Player**). Note: these instructions are for *version 10* only.

3. Insert an audio CD into the computer's CD drive. The CD will start to play after a few seconds delay. Click the **Stop** button at the bottom of the window to stop playing.

4. In the *Windows Media Player* window, pull down the **Tools** menu and select **Options**. In the **Options** window, click in the **Rip Music** tab, click on the "Format" menu and select "**mp3**". Then check "Eject CD when ripping is complete" and uncheck "Rip CD when inserted". Slide the "Audio quality" slider all the way to the left ("Smallest Size"). Then click **OK**. (Note: these settings are automatically saved, so you only have to do this the first time).

5. Click on the **Rip** tab at the top of the *Windows Media Player* window and click the **Rip music** button at the top right. The copying process will begin . *You will not hear the music while it copies*, because the program spins the CD much faster than normal. Copying a CD takes much less time than playing the CD normally.

6. Once copying is complete, the audio disk is ejected. Each selected track on the CD will have been saved in **mp3** format (assuming you selected mp3 format in step 4) into a folder in "My Documents" => "My Music". The files will be in folders that *Windows Media Player* automatically creates and names for each album that you record.

Burning an audio CD Note: you must have a CD-writer (CD-RW) on your PC.

1. To burn an audio CD from any music tracks or albums that you have previously recorded, insert an ordinary blank CD-R into your CD-R drive (do *not* use a CD-RW disk).

2. After a few moments, a dialog box will pop up that asks you "What you want Windows to do?" Click on "**Burn a CD** using Windows Media Player".

3. *Windows Media Player* will open up in the "Burn" mode. (If that does not happen, you can open *Windows Media Player* yourself and click on the **Burn** tab on the top). (Note: to make an MP3 disk rather than an audio disk, click on **CD Drive** at the top of the right-hand panel and select **Data CD.** To make a regular audio CD, select **Audio CD**).

4. To select music, click **Edit Playlist**. This will display all the artists you have copied. Click on the artist's name to see the albums copied for that artist. Click on the album name to see the songs on that album. To select an album or an individual song for copying the the blank CD, *right-click* on it and select "Add to Playlist". (If you select too many songs, the ones that don't fit are labeled "Will not fit" in the Status column). To remove a song, click once on it in the Burn List and press the **Delete** key OR click the red **X**. Click **OK** when done.

5. Click the **Start Burn** button at the top left to start the CD burning process. *Windows Media Player* will display the estimated time remaining to complete the process at the bottom of its window. When it is finished, it will eject the completed audio CD.

Computer music activities
You don't have to be a musician to have fun with music

Arranging MIDI songs using *Sweet MIDI Player*.

1. Put the *Digital Sound and Music* CD into the computer's CD drive. Open (right-click and select **Open**) **My Computer => CD Drive => Windows Software => Sweet MIDI Player** folder. Double-click on "Swmipl32".

2. Select **Options => MIDI Setup**. Click in the "**Output to:**" menu and select "Microsoft GS Wavetable SW..." from the menu. Click **OK**.

3. Select **Load MIDI file...** from the **File** menu, select the **CD-Drive (D:)**, double-click on "Other MIDI Examples", select one of the songs there and click **Open**.

4. Click on the right arrow to start the song. Click on the blue square to stop.

5. To change the volume (loudness) of an instrument, use the volume slider for that channel.

6. If you want to change the instrument assigned to a channel, click on the instrument name in the box below the volume slider and select another instrument.

7. If you want to change the tempo (speed), right- or left-click on the **Tempo Change** box.

8. If you want to change the key (i.e. make the pitch higher or lower), right- or left-click on the **Transpose** box.

9. If you want to set the left-right stereo position of an instrument, use the "Pan" knobs above its volume slider.

10. If you want to save the resulting file, select **Save MIDI file...** from the **File** menu.

11. Try some of the other MIDI files and experiment will different instruments.

Note: There are lots of other MIDI files that you can download from the Internet. On the *Digital Sound and Music* CD, open "Sound and Music Web sites" => "Downloadable sound and music files" => "MIDI files to download". Right-click and select **Open** to try some of these sites. Or you can use a search engine such as Google to search for MIDI and whatever type of music you want, e.g. MIDI jazz. Once you have located a link to a MIDI file (in .mid format), just right-click on the link and select "Save Target As..." from the pop-up menu. Navigate to a location that you will remember and click **Save**. (You can record your MIDI creation as a WAV file by running *Audacity* at the same time as the MIDI player, and setting the recording properties to accept input from the "mixer". Set the recording parameters to "stereo, 44 KHz" and save the file in MP3 or "Windows PCM (.wav)" format if you want to make an audio CD, e.g. with *MusicMatch* or *Windows Media Player*).

To explore the MIDI instrument sounds your computer has, go to http://www.buzzwood.com/ and click on "MIDI Voice Tester". Click on the instrument names to hear that instrument sound.

Computer Karaoke

The "Karaoke examples" folder on the *Digital Sound and Music* CD-ROM contains over 85 examples of MIDI-Karaoke KAR files, which contain the lyrics and the music accompaniment to a song. When played by a Karaoke program, the music will be played by your MIDI sound card and the lyrics will be displayed on the screen, synchronized to the music, for you to sing along with.

A simple Karaoke program called *WinKaraoke Player* is contained in the Windows software folder. Here's what to do:

1. Installing *WINkaraoke* (computer karaoke player)

1. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive. Open (double-click or right-click and select **Open) My Computer => CD Drive => Windows Software => WINkaraoke program => setup**.
2. On the next screen, click **OK**.
3. Click the big square button with the picture of a computer on it.
4. Click **Continue**
5. Click **Yes**.
6. Click **OK**.

2. Running *WINkaraoke* (computer karaoke player)

1. Once the program is installed, run it: select **Start => Programs => WinKaraoke Player 1.5 => WinKaraoke Player 1.5.**
2. In the *WinKaraoke Player* window, click where it says "C:", select "D:", and click on "Karoke examples".
3. Choose one of these files and click the PLAY button to display the lyrics window.
4. Click the right arrow to start playing. Click the square to stop.
5. Close *WinKaraoke Player's* lyrics window to select another song.

   Note 1: To change the size of the displayed lyrics, click **Options** in the main *WinKaraoke* window and then click on the **Font** button. Select a font and size and click **OK** to return to the *WinKaraoke* window . Then click the PLAY button to display the lyrics.

   Note 2: To print out the lyrics, click the **Export** button, navigate to a folder where you want to save the lyrics, type in a file name, and click **Save**. Then double-click on the resulting text file and Print it.

3. Changing the musical arrangements.

If you don't like the tempo, key, instrumentation, or instrument balance of the song, you can change these things using the *Sweet MIDI Player*. Here's how:

1. Open (right-click and select **Open**) **My Computer => CD Drive => Windows Software => Sweet MIDI Player** folder. Double-click on "Swmipl32".
2. Select **Options => MIDI Setup**. Click in the "**Output to:**" menu and select "Microsoft GS Wavetable SW..." from the menu. Click **OK**.
3. Select **Load MIDI file...** from the **File** menu, select "All Files" from the "Files of type" menu, navigate to the desired Karaoke (.kar) file, and click Open.
4. Click on the right arrow to start the song.
5. To change the volume (loudness) of an instrument, use the volume slider for that channel.
6. If you want to change the instrument assigned to a channel, click on the instrument name in the box below the volume slider and select another instrument.
7. If you want to change the tempo, right- or left-click on the **Tempo Change** box.
8. If you want to change the key, right- or left-click on the **Transpose** box.
9. To set the left-right stereo position of an instrument, use the "Pan" knob above its volume slider.
10. If you want to save the resulting file, select **Save MIDI file...** from the **File** menu, then **erase the ".mid" extension ion the file name and replace it with ".kar"** before clicking Save. (The saved files *must* have a .kar extension to be opened by *WinKaraoke Player*).

Note: To find other Karaoke files to download, try searching on Google for MIDI karaoke. To download a file, right-click on the link, select "Save target as...", change the file extension from "mid" to ".kar" extension so that they can be opened by *WinKaraoke Player*, then click **Save**.

Buying Music Online

A. Amazon.com - music CDs via mail order

A great way to look for books, music CDs, DVDs, etc. Big selection and good prices.

1. Open your Web browser, click on the address bar at the top, type in amazon.com/music, and press the enter key. (You can bookmark this site if you intend to come back later).

2. Look for the Search Music box on the left of the window. Click in the "Popular Music" menu and select the category you're interested in (e.g. Artist Name, Album Title, Song Title, Popular music, Used Music, Classical music, etc).

3. Type in what you are looking for (it might be the name of the artist, album, or song title, or you could just put in the type of music, e.g. jazz) and click on the Go button.

4. Albums matching your search terms will be listed in the center of the window in alphabetical order. Scroll down to see all of the matches.

5. Click the album title or the little graphic to display the album page. Scroll down on the album page to see all of the information, which includes a list of songs and reviews from editors and listeners.

6. Many albums allow you to listen to samples of the songs on the album, Scroll down until you see the "**Listen to Samples**" section. Try clicking on the blue "**Listen**" buttons to the right of the track title; depending on how your computer is configured, one of these is likely to work. You'll get a brief audio sample.

7. To buy the album, click on the "Add to shopping cart" button on the right.

B. Online digital music services - Buying music one song at a time

This is the new way to buy music: you download individual songs or whole albums to your hard disk, then burn them onto audio CDs or MP3 CDs using your CD burner. Individual songs usually cost $0.89 - $0.99 ea. The advantage is that you don't have to wait for the US Mail and you can create customized albums containing just the songs you like, in whatever order you like.

There are several such services listed in the "Digital Music Services" folder in "Sound and Music Web Sites" on the Digital Sound and Music CD-ROM. Two of the best are Apple's ITunes (go to itunes.com) and Roxio's Napster 2.0 (go to napster.com). Neither of these require a monthly subscription fee; you pay only for what you download. Both use special software (not your regular Web browser) that is optimized for convenient browsing, searching, listening to samples, and downloading.

C. Downloading free music

A good source of background music for multimedia slideshows, movies, etc., is **freeplaymusic.com**. They have over a thousand original music titles in MP3 format you can download for free, and you can use them for non-commercial educational projects entirely free of royalties. They have every style of music imaginable.

Procedure for Adding Sound to the Alphabet Book Web sites

1. Insert the workshop CD-ROM into the CD-ROM drive, label side up.
2. Double-click on "My Computer".
3. Double-click on the icon of the CD-ROM disk.

Prepare the partially completed folder for editing:

1. Drag either the "Maryland ABC book" or the "Florida ABC book" folder from the CD-ROM onto the desktop.
2. Close the CD-ROM window.
3. Double-click on the copy of the folder that you just copied to the desktop.
4. Select **Select All** from the **Edit** menu.
5. Right-click on any one of the files and select **Properties** from the pop-up menu.
6. Click on the **Read-only** box so that it is *not* checked and click **OK**.

Add a recorded comment for each letter.

1. Open (double-click on) the file "Text Content". Print it out if you prefer to read it on paper.
2. Connect and adjust the headset with microphone. (See page **B1** of this handout)
3. Click **Start => Programs => Accessories => Entertainment => Sound Recorder**.
4. Move the sound recorder window (by dragging the blue border at the top) so that it's not obscured by the "Text Content" document.
5. Start recording and read the comment for the letter "A" in the Text Content document.
6. If you're satisfied, go on to the next step. If not, Select **File => New,** click **No**, and repeat step 5.
7. Select **File => Save**, navigate to the Alphabet Book folder that you copied on the desktop, type the letter "a" into the File Name box, and click **Save**.
8. Select **File => New** to clear the old sound.
9. Repeat steps 5 - 8 for each letter of the alphabet, saving each a single-letter file name: a, b, c, etc.
10. Close the sound recorder program when you are done.

Test the Alphabet book site:

1. Open (double-click on) the file "index.htm" in the alphabet book folder on your desktop.
2. Navigate through the site by clicking on the navigation arrows.

Optional: Adding text to the letter pages:

1. Starting from the index page, click on the letter **A** to go to that page.
2. If you are using *Internet Explorer*, pull down the HTML **Edit** menu (the one on the right-hand side of the toolbar, not the usual Edit in the menu bar next to File) and select **Edit with Windows Notepad**. If you are using *Netscape*, select **Edit Page** under the **File** menu.
3. Edit **"A is for ..."** to read as you wish. (This text will appear *above* the picture)
4. Type a caption in the space between the <H2> and </H2> tags. (This text will appear *below* the picture, in a slightly smaller type size.)
5. **Save** the file.
6. To see how the page looks in the Web browser, click on the Web Browser in the task bar at the bottom of the screen (to activate its window) and click **Refresh**. If you see a mistake, click on the Notepad window, correct the text, and repeat steps 5 and 6. If you are satisfied, you can close the Notepad window (click on the x in the upper right).
7. Click on the right-arrow icon to move to the next letter and repeat step 2.

Talking Back(wards)

This is a fun exercise that helps you appreciate how difficult it is to pronounce unfamiliar language sounds exactly, why speakers of foreign languages often have difficulty pronouncing English correctly despite years of practice, and why we ourselves have difficulty being understood when we speak a foreign language, even if we are *sure* we are pronouncing everything perfectly.

A. First, we will use sound recorder to record a short spoken phrase:

1. Connect a microphone to your computer's sound input and adjust the sound settings as described on page **B1**.

2. Select **Start => Programs => Accessories => Entertainment => Sound Recorder**.

3. Click on the **round red button** to begin recording. Speak a short statement, such as "Hello, my name is _____". Click on the **black square button** to stop. Click on the **black triangle** to hear what you have recorded.

4. If you're satisfied, skip to step 5. If not, Select **File => New,** click **No**, and repeat step 3.

B. Next, we will reverse the sound recording, listen to it played backwards, and attempt to mimic that sound.

5. Select **Effects => Reverse** to reverse the sound recording in time (make it backwards).

6. Click on the **black triangle** to hear the reversed sound recording. It sounds strange, dosen't it? Like a foreign language. In fact, let's pretend that this is a phrase in a foreign language that you are trying to learn. Play the sound over and over again and try to mimic the sound exactly.

7. When you have practiced enough that you are confident you have memorized the sound and that you are reproducing the sound exactly, record your pronunciation: click on the **round red button** to begin recording, speak the backwards sound that you memorized, then click on the **black square button** to stop.

C. Now we will reverse the sound recording of the attempt to pronounce the backwards recording and compare it to the original.

8. If you have really mimicked the reversed sound exactly, then it should sound normal when you reverse the sound of the recorded backward phrase. Select **Effects => Reverse** and then click on the **black triangle** to hear your backward recording played backwards. Does it sound normal? Probably not.

9. Try the whole process again, this time trying even harder to reproduce exactly the sound of the reversed phrase. I'll bet that even your best efforts sound strange. This shows how very difficult it is to pronounce unfamiliar sounds exactly and how extraordinarily picky we are about the sound of our own language.

Mixing and blending Music with *Audacity*

Launch *Audacity*. **(Start => All Programs => Audacity)**. **Note:** If *Audacity* is not already on your computer, refer to the handout "How to Install Software..." for installation instructions.

A. Combining songs into a continuous medley

1. A *medley* is a series of songs or portions of songs that flow one into the other.
2. Pull down **Project => Import Audio...** , click in the **Look in** menu at the top, navigate to "Royalty-free Music" on the **D:** drive, and click on any one of the songs.
3. Repeat step 2 and select another song. Each song will be loaded into a separate track. You can cut out any parts of a song that you don't want: look at the upper left corner of the *Audacity* screen and click on the **selection tool** ⌶, select the region that you want to delete, and press the **delete** key on the keyboard.
4. Look at the upper left corner of the *Audacity* screen and click on the **time shift tool** ↔.
5. Use this tool to drag the second song to the right, overlapping with the first song so that the second song starts as the first one fades out. To hear what the transition sounds like, switch back to the **selection tool** ⌶, select the desired region, and click the play button
6. You can also "fade-out" the end of the first song and "fade in" the beginning of the next song: select the desired region, then pull down **Effect => Fade In** or **Fade Out**.
7. To save the entire medley as one MP3 file, select **File => Export as MP3...** , navigate to the desired save location, type in a file name into the **File name** box, and click **Save**.

B. Adding a vocal track (singing or spoken commentary) to a music file

1. Use this procedure to add voice narration to a music background, or to build up a multi-layer performance where you sing a duet with yourself, or play all the parts of an instrumental work, or to sing along with a karaoke accompaniment, etc. (See handout **B1**, "Recording sound with a microphone", for microphone set-up instructions).
2. Select **Edit => Preferences**. Click "Play other tracks while recording new one".
3. Under Recording/Channels, select **"1 (Mono)"**. If you were using a stereo microphone, you could use **"2 (Stereo)"**. Then click the **Quality** tab and select Default sample rate **44100 Hz**, default Sample format 32-bit float and click **OK**.
4. Pull down **Project => Import Audio...**, click in the **Look in** menu at the top, navigate to the folder containing the music, and select the music that you want to use.
5. Press the green **Play** button to play the music and click the **Stop** button to stop.
6. Click on the place in the music where you want to begin recording and click the **Record** button to begin recording from the microphone. Click the **Stop** button to stop. Each separate recording is added to a separate track. To play back the recording, press the **Play** button All the tracks are played back simultaneously, but you can use the **Mute** and **Solo** buttons on the left to mute (quiet) a track or to play it solo (by itself).
7. **Adjusting the volume of tracks**. Adjust the volume of any track by dragging the slider at the left-hand end of that track to make it softer or louder.
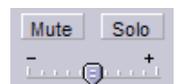
8. If you don't like a track that you have recorded, you can delete it by clicking on the close box ⊠ in the *upper left corner* of the waveform window, then record again.

9. To delete sections of any audio track that you don't want, drag the mouse pointer over that section of the waveform and press the **Delete** key. To hear one section of the sound file, drag the mouse pointer over that portion of the waveform and click the **Play** button or press the space bar. You can also **Cut**, **Copy**, and **Paste** sections of a sound file.

10. **Aligning the tracks.** Click on the **time shift tool** ↔ in the upper left corner of the *Audacity* screen. Use this tool to shift each track into its proper place. To hear what that section sounds like, switch back to the **selection tool** I, select the desired section of the waveform, and press the **space bar** to start and stop.

11. **Adding other sound tracks**. While the other tracks are still showing on the screen, you can pull down **Project** => **Import Audio...** to add another audio file (in WAV or MP3 format) to the project. Use the **time shift tool** ↔ to shift each track into its proper place. Adjust the overall volume of a track by dragging the slider at the left-hand end of that track so that it is not too loud. Note: You can also **Cut**, **Copy**, and **Paste** sections of a sound file within a track and between tracks.

12. **(Optional) Fading the music up and down.** If you want to fade the music up in the pauses between narrative comments, then fade it back down when the narration continues, click on the **Envelope Tool** in the upper left corner. Use this tool to click on the waveform to create drag points (little dots) and then use them to drag the envelope up and down to fade the music up and down as needed. (This takes some practice).

13. **(Optional) Special Effects.** You can add various special effects to any track. It's best to add effect to a *copy* of the audio track. First, select the track by clicking on the white area to the left of the waveform, below the L/R slider. Select **Edit** => **Copy**. Then pull down **Project** and select **New Stereo Track**. Select **Edit** => **Paste.** Then pull down **Effect** and select the desired effect. For example, to add richness to a solo instrumental or singing performance, try adding reverberation (**GVerb**) and **Phaser** effects. When you click the Play button, both the original and effect-processed sound will play simultaneously. You can conveniently control the blend of original and effect-processed sound by adjusting the slider at the left-hand end of that track to make that track softer or louder. (For information about the various effects available, click **Help** => **Contents...,** then double-click **Audacity Help, Menu Bar,** and **Effect Menu.)**

14. **Saving**. To save the sound file, select **File** => **Export as MP3...** , navigate to the desired location (e.g. the "Sounds" folder on the desktop), type in a file name into the File name box, and click **Save**. The resulting MP3 file can be used just like any other MP3 file.

15. To save the entire *Audacity* screen with all the separate tracks, select **File** => **Save Project**. You can open the project file later in *Audacity* and continue working on the project. Close *Audacity* when you are finished.

Converting Vinyl Records and Tapes into Audio CDs

Connecting and adjusting the sound settings for recording

1. Connect the auxillary or tape output of your preamp, receiver, or tape player, to the "line in" input of the computer with a suitable patch cord. The "line in" input is usually on the back of your computer; it's a 1/8" round hole, often with a symbol of an arrow pointing into the hole. Some sound cards have a *single physical input jack* that is used for both the microphone *and* line-in input. If in doubt, refer to the manual that came with your computer, or simply try each of the holes back there until you find the one that works. You can find the patch cord you need at Circuit City or Radio Shack; you'll need one with a 1/8" stereo mini-plug at one end to connect to the "line in" input and a plug at the other end that matches your stereo system aux output or tape recorder's output. Note: You can *not* connect a normal component turntable *directly* to the computer: the signal level is too low and RIAA equalization is required; connect it through your preamp or receiver instead. If you don't have a turntable, or if your stereo system is too far from your computer, consider buying a portable turntable with line-level outputs, such as the *Vestax Handy Trax* (http://www.vestax.com/products/HandyTrax.htm), about $150.

2. Double-click on the volume control in the taskbar on the lower right corner of the screen. Make sure that the Mute box under "Mic" is checked and that the one under "Line in" is *not* checked and that the "line-in" volume is turned up.

3. Select **Options** => **Properties**

4. Click once on **Recording.**

5. Click **OK**. This opens the Recording Control Box.

6. **Important**! *Make sure that the **Select** checkbox is checked under "Line-in".* **Note:** Some sound cards have a *single physical input jack* that is used for both the microphone *and* line-in input, depending upon which input is selected in the Recording Control Box. You can now close the box.

Selecting a Recording Method

There are two different methods detailed here, using different software and having certain pros and cons. Except for the noise reduction features, both methods can give identical final results on the audio CD. **Method 1** uses the freeware *Audacity* to record. It has the advantage of a built-in noise reduction function. Also, you can actually see the recorded waveform, making it easy to delete undesired portions or to use Copy and Paste for special effects. However, it does not automatically recognize and separate the tracks on a record; you have to do that manually. This is probably the best method for very old records that have lots of scratches and clicks. **Method 2,** which uses the full version of *MusicMatch* (which you must purchase for $20), has the advantage that it can automatically recognize and separate the tracks on a record. However, there is no easy way to tell that the recording level is adequate until you make a test recording, and there is no built-in noise reduction function. Still, this method is convenient and would work well for records and tapes in good condition.

Method 1: Using *Audacity* to record and *MusicMatch* to burn

1. Launch *Audacity*. (**Start** => **All Programs** => **Audacity**). If *Audacity* is not already installed on your computer, refer to handout **A5**: "Installing Software used in the Digital Sound and Music Workshop" for instructions.

2. Select **Edit** => **Preferences**. Under Recording/Channels, select "**2 (Stereo)**". Click the **Quality** tab and select Default sample rate **44100 Hz**, default Sample format 32-bit float and click **OK**.

3. Click the little triangle to the right of the microphone icon near the top center of the *Audacity* screen.

4. Start up the record or tape player and play a loud portion of the music. Adjust the volume control on the tape or record player (and on volume slider near the microphone icon at the top right of the *Audacity* screen) so that the two red bars get near but do not reach the right-hand limit on the loudest parts of the music; this will insure that the sound is loud enough but does not overload or distort. (If you get no response at all, you probably didn't do the set-up correctly - repeat the steps under "Connecting and adjusting the sound settings" at the top of this document).

5. Click the **round red** button to begin recording and start the tape or record player.

6. *Audacity* will record the music until you click on the **square (Stop)** button.

7**.** When the recording is complete, click once on the **square stop button** to stop the recording and then click the **green triangle** to play what you have recorded. If you don't like what you have recorded, you can delete it by clicking on the close box [x] in the *upper left corner* of the waveform window, then repeat steps 4 - 7. (If the volume is too soft, even if you turn the playback volume all the way up, turn *up* the volume control on the tape or record player and on volume slider near the microphone icon at the top right of the *Audacity* screen. If the volume is too loud and distorted, even if you turn down the playback volume, turn *down* the volume control on the tape or record player and on volume slider near the microphone icon at the top right of the *Audacity* screen).

Note: If the record or tape consists of several separate songs, you can either stop the recording after each song, and save the resulting file as the name of that song, or you can record the whole tape or record side and then separate the digital recording into separate tracks later (see step 10).

8. You can clean up your recording by deleting silences and removing large pops and clicks that are visible in the recorded waveform. To listen to any section of the music, just drag the mouse over that section and click once on the **Play** button (green triangle). To delete a section, drag the mouse over the undesired section and press the **delete** key. Use the **Zoom**, **In**, and **Out** buttons (they look like magnifying glasses) to zoom in and out on the waveform so you can see smaller sections clearly. Note: it's best to leave 1-2 seconds of "silence" at the beginning and end of the sound to act as a separator between songs.

9. You can reduce the background noise of your recording by using the noise reduction effect. First, zoom in on the beginning of the song and select (drag the mouse over) a section of "silence" that has only the background noise, e.g. the lead-in right before the music starts. Then click **Effect** => **Noise Removal...** and click once on **Get noise Profile**. Then pull down the **Edit** menu and select **Select All**. Finally, click **Effect** => **Noise Removal...** again and click **Remove Noise**. The noise reduction process will take about 30 seconds to 1 minute for a single song.

10. To save the entire recording as one song, select **File => Export as MP3...** , type in a file name into the File name box, click in the "Save in" pop up menu and select "**My Documents**" => "**My Music**", and click **Save**. Alternatively, if you recorded several songs together into one long waveform, then drag the mouse over each song in turn and pull down **File => Export Selection as MP3...** Repeat for each song. Once you've saved all the separate songs, you can delete the combined recording (click on the close box [x] in the *upper left corner* of the waveform window).

11. In order to make and audio CD of the tracks you have recorded, open the folder contain the tracks and click once on "Copy all items to audio CD" in the left-hand Music Tasks panel. (Or, select the desired tracks, right-click on the tracks, and select "Copy to CD or device"). This brings up the *Windows Media Player* window.

12. Insert a blank CD-R into the CD burner drive and click the red **Copy** button in the *Windows Media Player* window to start burning the disk.

13. The disk will be ejected when the operation is complete (takes several minutes).

14. To print a jewel case label for the CD, complete with a list of tracks,. select **File** => **Print label....**

and follow the on-screen directions. Cut out and insert into the jewel case. Remove your CD and label it. Repeat steps 12 - 14 for each audio CD you want to make.

Method 2: Using *MusicMatch* to record (requires the full $20 version of *MusicMatch*).

1. Run *MusicMatch*. (**Start** => **Programs** => **MusicMatch Jukebox**.
2. Pull down MusicMatch's **Options** menu and select **Recorder** => **Source** => **Line in**.
3. Pull down MusicMatch's **Options** menu and select **Recorder** => **Settings**.
4. Click once on the **Advanced** button.
5. Under **Auto song detect**, click once on **Active** so that it is checked. Click **OK** twice to return to the *MusicMatch* main panel.
6. If the RECORDER panel is not showing below the main *MusicMatch* window, click once on the *red round button*.
5. The Recorder window will display the words "artist" and "album" on the left side of the Recorder panel. Click once on these words and type in the actual names of the artist and album that you are going to record. *MusicMatch* uses these names to create folders to save the recorded music files in, so remember these names so you can easily find the recorded files later.
6. Click once on the red round button on the recorder panel to begin recording. Start the tape playing or place the needle in the desired groove of the record.
7. *MusicMatch* automatically recognizes the silences between the tracks and records each track in turn, labeling it "line in track 1", "line in track 2", etc. If the record or tape has another side that you want to record, click once on the **Stop** (square blue) button on *MusicMatch*, flip the record or tape over, and click once on the red round button **Record** button to continue recording. At the end of the tape or record, click the **Cancel** (x) button to stop recording.
8. Once the recording is complete, each track will have been saved (in MP3 format) into a folder in "**My Documents**" => "**My Music**". The files will be in a folder that *MusicMatch* automatically creates and names according to the names you typed into the recorder panel before you started. (If you forgot to do this, the folder will be named simply "artist". You may re-name the folder if you like after the fact). Note: If all you get is silence, you probably didn't do the set-up correctly - repeat the steps under "Connecting and adjusting the sound settings" at the top of this document. If the sound is too loud and distorted, reduce the volume control on the tape or record player and try again.
9. *Optional*. If you like, you may rename the tracks with the actual song names. Open "**My Documents**" => "**My Music**" and look for the folder named for the album you just recorded. Open the folder, right-click on each track and select **Rename**. Type in the name of the song on that track and press the **Enter** key.
10. Click *once* on the **Burn** button at the bottom of the playlist window (brings up **Burner** window).
11. Click once on the square button that has a musical note on it (this means to burn an audio CD).
12. Click once on the **Explorer** button at the top of the **Burner** window. Click once on the + sign to the left of the "My Music" folder to display all the albums that have been recorded. Click once on any album to display its music tracks.
13. Drag the desired music tracks onto the **Burner** window. If the dragged files to not accepted and listed in the Burner window, they are the wrong format for that type of disk.
14. To rearrange the order of the tracks, just drag and drop the titles within the **Burner** window.
15. The green bar at the bottom of the window tells you how much room you have left on the disk. If it's red it means that you have too many files; right-click on a track and select **Remove file** to remove it from the burner list.

16. Insert a blank CD-R disk into the CD-R drive and click once on the **Burn** button to begin burning. This may take several minutes. When it is finished, the CD will be ejected.

17. To print a label for the CD case, complete with a list of tracks, click once on the **Print** button in the Burner window. Click "Back cover settings" under Layout Settings, type in an overall label for the album, and click **Print**. Cut out the track list and insert into the jewel case.

18. Remove your CD and label it. Repeat steps 12 - 18 for each audio CD you want to make.

19. Close the **Burner** window when you are finished. (To return *MusicMatch* to the normal mode for recording audio CDs, pull down the **Options** menu and select **Recorder** => **Source** and select the desired CD drive).

Reducing Noise in Digitized Analog Recordings using *Audacity*

Opening up a prerecorded file in Audacity

1. Launch *Audacity*. (**Start** => **All Programs** => **Audacity**). If *Audacity* is not already installed on your computer, refer to handout **B5**: "Installing Software used in the Digital Sound and Music Workshop" for instructions.
2. Put the *Digital Sound and Music* CD-ROM into the computer's CD-ROM drive.
3. Select **Project** => **Import Audio...**. Click in the "Look in" menu at the top and select the CD drive (the icon looks like a round CD disk).
4. Look in the list for the folder named "Old Records". Double-click on that folder or click on it once and click **Open**.
5. Open (double-click on) "Original".
6. The waveform will be displayed. To play it, press the **space bar**, or click the green triangle ▶. Listen on your headphones so you can hear clearly. As the song plays, the cursor line moves through the waveform.
7. *While the song is playing*, click the 🔍 button (looks like a magnifying glass with a plus on it). Zooming in will allow you to see details of the waveform more clearly. You will be able to see the individual notes as they slide by. You will also be able to see some pops and clicks as sharp spikes that stick out from the smoother music waveform. These are caused by tiny scratches on the surface of the record.

Removing pops and clicks

1. Click the 🔍 button to display the entire waveform, then click the green triangle **Play** button. ▶ As the song starts to play, click the 🔍 button two or three times until you can see the individual notes scrolling by as the music plays.
2. When you hear a click that you want to remove, press the **spacebar** immediately to stop the song at that point. The portion of the waveform that was playing at that point is displayed in the center of the screen.
3. If you can see the click as a spike near the center of the screen, drag the mouse over two or three notes around that region and click the 🔍 button to zoom in on that region. Click the **Play** button to play just that region.
4. Carefully drag the mouse over the spike, so that only it is highlighted, and press the **delete** key on the keyboard. Click the mouse at the beginning of that region and press the **spacebar** (or click **Play**) to see if the click is removed.
5. Click 🔍 a times few to zoom out and press the **spacebar** (or click **Play**) to continue playing.
6. Select **File** => **Close** and click **No** when it asks you if you want to "Save Changes...".

Automatic Noise Reduction

1. Select **Project** => **Import Audio...**. and double-click on "Original"
2. Drag the mouse over the first 10 seconds of the song and click the ⊕ button. You should see section of "silence" that has only the background noise, e.g. the lead-in right before the music starts, followed by the first few notes of the song.
3. Select (drag the mouse over) the lead-in ("silence") before the music starts.
4. Click **Effect** => **Noise Removal...** and click once on **Get noise Profile**.
5. Pull down the **Edit** menu and click **Select** => **All**.
6. Click **Effect** => **Noise Removal...** again and click **Remove Noise**. The noise reduction process will take about 30 seconds to 1 minute for a single song, more for several songs strung together.
7. To save the entire recording as one song, select **File** => **Export as MP3...** , type in a file name into the File name box, click in the "Save in" pop up menu and select the desired save location, and click **Save**.

Comparing other methods of recording

1. Click **Start** => **Programs** => **Accessories** => **Entertainment** => **Windows Media Player**. This is a general-purpose player application that is supplied with all Windows machines. It can play most types of music, sound, and video files.
2. Click on the **Now Playing** tab on the upper left corner of the Windows Media Player window. (If that's not showing, click on the little skinny "Show Taskbar" button on the left edge of the window)
3. Select **File** => **Open**. If the File menu is not showing, click the tiny round button in the upper left.
4. Click in the "Look in" menu at the top and select the CD drive (icon looks like a round CD disk).
5. Look in the list for the "Old Records" folder. Double-click on that folder or click on it once and click **Open**.
6. Several files are listed. The following three files are original (unfiltered) recordings of Nat King Cole's "Honeysuckle Rose" from his "Trio Days" album, using three different recording programs and saved in three different sound file formats:

"MusicMatch"	Recorded using *MusicMatch*	MP3 format
"Cool Edit"	Recorded using *Cool Edit*	WAV format
"Plus Analog Recorder"	Recorded using *Analog Recorder*	WMA format

To listen to one of these, click on it and click **Open**. To listen to another, select **File** => **Open**. and repeat this procedure. Compare the three files listed above and see if you can hear any difference caused by the recording program or by the different formats they are recording in. (Most people can hear little or no difference). Now open the file "Plus Analog Recorder reduced pops and hiss" and compare to "Plus Analog Recorder original". This demonstrates *Plus Analog Recorder's* pop and hiss filter.

7. If you have time, try opening and listening to some of the sound files in "Sound file examples" on the CD-ROM. Put your Sound and Music CD-ROM into the CD drive, select **File** => **Open**, click in the "Look in" menu at the top and double-click the CD-ROM icon, then double-click "Sound file examples".

Using *Memories On TV 3.0* to make Video Slide Shows of your Digital Pictures

Requires: Windows 98/Me/2000/XP, CD-RW drive. Web Address: memoriesontv.com

A. Downloading the latest version of *Memories On TV*

1. Open your Web browser and go to memoriesontv.com.
2. Click once on "Try out MemoriesOnTV".
3. Click once on the "Download from CNET".
4. Click once on "**Download Now"**.
5. Click once on the **Save** button. The installer will be downloaded to your desktop. When the download is complete, you can close your Web browser.

B. Installing *Memories On TV*

1. Double-click on the ".exe" file that you downloaded to your desktop in the previous step.
2. The "Welcome to Memories On TV Setup Wizard" will be displayed. Click on **Next**.
3. Click "I accept this agreement" and click **Next**.
4. Keep on clicking **Next** until you get to the screen that has an Install button.
5. Click **Install,** then click **Finish**.

C. Using *Memories On TV 3.0*

1. Double-click on the "MemoriesOnTV" icon or select **Start** => **Programs** => **Memories On TV** => **MemoriesOnTV**.
2. Click **Evaluate**. (If you decide to purchase the program, click **Get Now** and follow the instructions).
3. Close the "Tip of the Day" window.
4. Use the file browser in the bottom half of the window to open the folder containing the pictures or video clips that you want to use. Click the Change view icon to see pictures.
5. Drag the desired files into the top window. You can combine any number of picture or video from any folder. To delete a picture, click once on it and press the delete key.
6. You can change the order of the pictures by dragging and dropping within the top panel. Check to make sure all the pictures are upright. If any of the pictures need to be rotated, double-click that picture, click the **Transform** tab, and click the desired rotation.
7. To preview the slide show so far, click the purple **Preview** button, then click on the small thumbnail picture to view the slide show. Click the close box to cancel the preview mode.
8. If you want to add background music, click the **Music** button near the center of the window. Click the + button in the bottom left corner of the window, navigate to the "My Music" folder, and double-click on the desired music file (it must be in MP3 or WAV format). (Note: the program does not come with music; you must already have the music on your computer. You can download free music from freeplaymusic.com or you can copy songs from music CDs onto your computer using *Windows Media Player 10*.)

   You can also add a bit of narration or music or a sound affect to an *individual* slide, overlaid with the background music: double-click that picture and click the **Music** tab. Click the [**...**] button to select a sound file, click **Open**, then click **OK**.

9. If you want to crop a picture (show only a portion of the picture), double-click that picture and click the **Transform** tab at the bottom. Click the **Crop** button on the right. Drag any of the small black squares in the corners of the picture to define the desired picture area. You can also drag the center of the area. Click **OK**.

10. If you want to manually control the panning and zooming effect on any picture, double-click that picture and click the **Pan/Zoom** tab at the bottom. Use the **Zoom** slider and drag the picture to define the *start* of that frame, then click the little > button and use the **Zoom** slider and drag the picture to define the *end* of that frame. Click **OK** when finished.

11. If you want to add a title or text label to any picture, double-click that picture and click the **Text** tab. Click the + button, then double-click the blue line. Select the desired font, size, and color, and type the text. Drag the text to the desired position on the picture. Click **Done**. To add another text label to the same slide, click + and repeat. When you are finished adding text labels that that picture, click **OK**. (Optional: You can also assign animation effects to each text label, like *Powerpoint.* To do this, double-click any slide that has text labels, then edit or select the items under the column heading "Start Time", "Effect", "Duration", "Effect Duration" to choose text effects and set timing for that label).

12. If you want to change the transition effect between the slides, click the **Import** button near the center of the window and then click the Timeline button 🕐 near the top of the window. This displays the slide show in timeline mode. Click on the little icons between two slides and select the desired transition from the pop-up menu. To preview the effect, click the previous slide and click the Start button (triangle in the circle). You can also change how long each slide is displayed by editing the number displayed below each slide.

13. If you want to add more pictures, click the **Import** button near the center of the window and drag more pictures into the slide show. If you want to have another group of pictures that has different background music, click on the small + button at the left center of the screen and select **New Track** from the pop-up menu. Then add pictures and music as before. Tracks play sequentially without pause. (When you play it on a DVD player, you can skip to the next track by pressing the **skip** or **next** button on the remote control).

14. If you want to make *another slide show video on the same disk*, click on the small + button at the left center of the screen and select **New Album** from the pop-up menu. Each slide show is called an "album". They are initially named "Album 1", "Album 2", etc, but you can re-name them by clicking on the name in the top left panel and typing a new name. You can have up to 12 separate albums on one DVD. Each album will be displayed on the DVD menu as a little thumbnail picture that can be selected and played independently.

15. *You should save your project often*, just in case it freezes or crashes, so you won't loose all your work up until then. Select **File => Save**, give it a suitable name, and click **Save**. The default save location is the "My Documents" folder. You can open up the saved project later, edit it in any way (add or delete pictures or change anything), and generate a new video and burn a new video disk (but you can't edit the disk itself after it's burned).

16. To create an MPEG file of your video (for viewing on a computer screen or Web page), click the **Burn** button, click "**Generate new video**", click the **Options** button, and click "Generate MPEG files only". Finally, click the **Start** button. No CD-RW burner is required. The MPEG files will be stored in My Document/MemoriesOnTV/untitled/.

17. To burn a disc to view on TV, click the **Burn** button, click **VCD, SVCD**, or **DVD** at the top of the screen, and click "**Generate new video and burn onto disc**". Put in a blank CD-R (or DVD-R) disc into your CD-RW (or DVD-RW) drive, select that drive from the **Disk Writer** menu, and click **Start**. Once you have burned the first disc, making additional copies is very quick; just put a blank disc in, click on "**Burn existing video onto Disk**", and click the **Start** button.

The Different Kinds of Disks

Floppy Disk (3.5" floppy)
The oldest, slowest and smallest disk in current use. Holds up to 1.44 MBytes (enough for about 400 pages of text, but not enough for even 1 digital photo or MP3 song). Erasable and reusable. Many new computer models don't even include them - use a CD-R or CD-RW instead.

CD Data disk (CD-ROM: "Compact Disc - Read-only Memory")
A CD that may contain any mix of computer programs or data (test, pictures, music files, etc). Can hold up to 700 Mbytes (equivalent to 486 floppy disks, enough to hold roughly 150,000 pages of text, or 350 digital photos, or 200 MP3 songs). Can be used on any computer with a CD (CD-ROM) drive. CDs can not be erased or modified in any way. You can make your own data CD-ROMs if your computer has a CD-burner and the software that came with it. Use any standard blank CD-Rs (not CD-RWs).

CD-R ("CD - Recordable")
A CD created with a computer's CD-RW drive (often called a CD "burner" or "writer") using a CD-R blank. Same capacity as a CD-ROM. The blanks cost about 25¢ each and are available in any computer or office supply store. A CD-R can not be erased or modified in any way once it is recorded. All recent computers come with CD-RW drives, but older computers have only CD readers that can read but not burn CD-R disks. If your computer didn't come with a CD-burner, you can add an external one easily - it attaches to a spare USB port.

CD-RW ("CD - Re**W**ritable")
A CD created with a computer's CD-RW drive using a CD-RW blank (available in any computer or office supply store). Same capacity as a CD-ROM. CD-RW disks can be erased and re-recorded just like a floppy or hard disk. However, CD-RW disks can only be read in CD-RW drives, not in the ordinary CD drives of older computers. Useful for computer data back-ups, especially for data that changes often. CD-RW drives can burn either CD-Rs or CD-RWs, depending on the type of blank disk you put in. If your computer didn't come with a CD-burner, you can add an external one easily for $30 - 40; it attaches to any available USB port.

Audio CD is a special format of CD containing music or audio book recordings.
Plays about 1 hour maximum. Holds about 20-25 standard 3-minute songs. Plays on any ordinary CD-player, boombox, car CD player, or on your computer. You can make you own custom audio CDs using an ordinary CD-burner, *Windows Media Player*, *MusicMatch,* or similar software, and any standard blank CD-R (not CD-RW - you can *not* use a CD-RW disk to make an audio CD) . You can also copy (or "rip") your commercial audio CDs to your hard drive (converting the songs into MP3 files, using software such as *Windows Media Player* or *MusicMatch*. The the songs can be re-assembled into custom audio or MP3 CDs or used to add music to slide shows and home movies. Or you can transfer the MP3 files to a portable music player (e.g. like an Ipod) via a USB cable.

MP3 disk is a computer data disk containing songs in compressed MP3 format.
Plays about 10-12 hours maximum - about 200-250 standard 3-minute songs. You can create MP3 files from your audio CDs by "ripping" them with *Windows Media Player* or *MusicMatch* or other software. (Some audio books are now being sold in MP3 format, which allows the entire book to be fit onto one disk). Plays on MP3 disk players, recent DVD players and some car CD players (2003 models and later). You can make you own MP3 disks with your computer's CD-burner. Use any standard blank CD-Rs (not CD-RWs).

Photo or JPEG disk is a computer CD-ROM containing digital photos in JPEG format.
The newer JPEG-compatible DVD players will play JPEG disks, showing a simple slide show of the

pictures on the TV. You can also view the pictures on your computer (using Windows XP's built-in Picture Viewer). Commercial photo CDs from a photo processor often have built-in auto-run software that automatically runs when you insert the disk.

DVD (Digital Video Disk) was originally developed for playing movies.

Looks like a CD but requires a different player and disk media. Usually used for movies, but can also be used for data storage (pictures or music files).

Holds up to 4.7 Gigabytes (4700 megabytes, the equivalent of over 6 CDs or 3263 floppy disks, enough to hold 700,000 pages of text, 1800 digital photos, or 1200 MP3 songs). The newer double-layer DVDs hold twice that. Playable only in your computer's DVD drive or in a stand-alone DVD player (for viewing movies).

You can make data DVDs using DVD/R or DVD/RW blanks and a DVD burner, available as an add-on to your computer for about $100 (in 2006). Blank DVD disks are available at computer stores and typically cost $0.50 - $1 each. Double-layer DVD blanks are much more expensive. There are two types of DVD blank disks, DVD+R and DVD-R (also DVD+RW and DVD-RW). Most older burners and players can only create and play one kind; the latest "dual mode" equipment will handle both types. Make sure you buy the type that your DVD recorder and player can handle.

VCD (Video CD) and SVCD (Super Video CD)

A CD with video content. Contains up to 1 hour of full-motion video with sound. SVCDs have better video and sound quality that VCDs, almost as good as a DVD. Both can be made with an ordinary computer's CD burner using ordinary blank CD-Rs, using software such as *Memories on TV* or *Photo Story 2* ($20, in *Microsoft Plus Digital Media Edition,* for Windows XP only). Can be played on your computer and on recent DVD players, but not older models.

Mini disk (3")

Same uses as regular CD disk, but holds about 1/3 as much stuff. Used in some digital cameras and portable music players. May contain computer data, pictures, music, etc. Playable in your computer's regular CD-ROM drive. You can also create these with an ordinary computer CD burner and mini CD-R blanks. The disks fit into the recessed circle in the center of the CD drive's tray.

How to copy files to a CD-RW drive

1. Put a blank disk (CD-R or CD-RW) into the CD-RW drive.
2. If the computer displays a menu of choices, select "Open writable CD folder...". Otherwise, open **My Computer => CD-RW Drive**.
3. Open the folder containing the files you want to copy and drag them to the CD-RW window. Or you can click once on the file or folder that you want to copy, then click "Copy this file (or folder)" in the left-hand panel of tasks.
4. Pull down the **File** menu in the CD-R window and select "**Write these files to CD**".
5. The **CD Writing Wizard** opens. Click **Next** and follow the remaining instructions.

Note 1: To check to see if your computer is set up for CD recording, open **My Computer**, right-click on the **CD-R drive**, select **Properties**, click on the **Recording** tab, and make sure that "Enable CD recording on this drive" is checked.

Note 2: An alternative to the above procedure is to use specific CD-writing programs such as *RecordNow*, *Nero Express*, or *Roxio CD Creator*, etc. Such programs are often supplied on new computers and on external add-on CD burners. Look for the Help menu, or click **?**, or press F1.

How to control what happens every time you insert a CD-ROM disk
(*Windows XP*)

Every time you insert a CD-ROM or CD-R disk into a Windows XP computer's CD drive, the computer takes a few seconds to inspect the contents of that disk. What happens next depends on how your computer is configured and what kind of content is on the CD. It might do nothing, it might display a list of possible actions and ask what to do, or it might automatically perform some actions without asking. *You can control what happens* every time you insert a disc by following these steps:

1. Open **My Computer**. (Right-click on the **My Computer** icon on the desktop and select **Open)**.

2. Right-click on the icon on the CD-ROM and select **Properties**.

3. Click once on the **AutoPlay** tab at the top of the window.

4. Click once in the pop-up menu at the top of the window. This menu lists several different content types that might be on any CD disk that you might insert into the computer:

Music files	MP3 files, WAV files, or any other sound file types
Pictures	JPEG (.jpg) files or any other image file types
Video files	AVI, MOV, or WMV files
Mixed content	A mix of files, programs, and folders
Music CD	An ordinary audio CD that plays on an audio CD player
Blank CD	A blank CD-R or CD-RW disk

5. Select each of these content types in turn. For each type, the current action taken for that content type will be indicated in the "**Actions**" section below.

6. If the button for "**Prompt me each time to choose an action**" is selected, that means that every time you insert a CD disk, the computer will display a menu of possible actions and wait for you to select the one you want. For example:

    For disks containing digital photos, the computer will give you several choices, including: Copy the pictures to a folder (on your hard disk); View a slideshow of the images; Print the images, Open folder to view files, etc.

    For disks containing music files, the choices will include: Play in Windows Media Player; Open folder to view files, etc.

    For music CDs, choices will include: Play in Windows Media Player; Copy music from CD, etc.

7. If the button for "**Select an action to perform**" is selected, then it means that *every time you insert a CD disk of that type, the computer will automatically perform the action that is highlighted without asking*. If you want *nothing* to happen, click once on "**Take no action**". To change the action, simply click once on the desired action and then click once the **Apply** button in the lower right.

8. You can choose whatever automatic action is most comfortable and convenient for each content type. You can change these setting at any time if you change your mind later. When you have finished, click **OK** to close the Properties box.

Using the Common Tasks menu in Windows XP

The **Common Tasks** menu is a panel on the left of every open folder window that lists common tasks. It makes it much easier to do the most commonly performed tasks, like copying and moving files and folders, and renaming, deleting, printing and e-mailing files.

Showing the Common Tasks menu

If your computer does *not* show a menu of common tasks on the left-hand side of every open folder, perform the following steps (you only need to do this once).

1. Open any folder by double-clicking it (e.g. the **My Documents** folder on the desktop).

2. Pull down the **Tools** menu

3. Click on **Folder Options**.

4. Click where is says "Show common tasks in folders" at the top.

5. Click **OK**. Windows applies this setting to *every* folder.

Note: *You only have to do this once*. Windows will remember this setting.

Using the Common Tasks menu

To perform one of the tasks listed, just click it and Windows will perform this task. *The tasks that are listed will change* depending on the types of files in the folder and whether you have one or more files selected.

- To select a file, click on it *once*, so that it is highlighted.
- To select two or more files, click *once* on the first file, then hold down the **Ctrl** key (lower left corner of the keyboard) and click on the other files that you wish to select while holding hold down the **Ctrl** key. All the selected files will be highlighted.
- To select all the files in a folder, pull down the **Edit** menu and click **Select All**.

So, for example, if you want to rename, or delete, or print a file, select the file (by clicking on it once) and then click **Rename this file**, or **Print this file**, or **Delete this file** in the common tasks panel.

For another example, to move a file to another location (i.e. to another folder or disk), select the file (by clicking on it once) and then click **Move this file** in the common tasks panel. Windows displays a box in the middle to the screen that asks you to select (click on) the place (folder or disk) where to want the file moved, then click the **Move** button to complete the task. You can also move folders this way.

Changing the folder type for photo and music files

Pull down the **View** menu and select **Customize this folder**.... Click the pop-up menu at the top ("What kind of folder do you want?") and select "Pictures" or "Music" and click **OK**. This setting will change add Picture Tasks or Music Tasks to the top of the common tasks.

Types of Sound and Music Programs

A. Sound programs

a. Sound players. All desktop computers now being sold include a sound player program (such as *Windows Media Player* or *Quicktime*) that is capable of playing back digitized sound files in all the common audio formats (WAV, AU, AIFF, MP3, WMA, and MIDI). For older computers that don't have their own sound players, you can use freeware sound players, such as *WinAmp* (for Windows) and *GrayAmp* (for Mac), in the Windows and Mac software folders.

b. Sound recorders. All desktop computers now being sold include a sound recorder program that can record sound from a microphone or other sound signal source connected to the sound input jack on the back of the computer. For example, Windows machines are supplied with the simple *Sound Recorder*. There are many third-party sound recorder programs with additional features: for example *Audacity* (for PC or Mac) can record sounds and then save them the compressed MP3 format. See handout **B1-2**.

c. Sound editors: Third-party sound editor programs (such as *Audacity*) perform sound recording and playback, and additionally allow you to edit the sound file - deleting parts you don't want, coping and pasting, adjusting volume, applying equalizers and filters, and adding various special effects. The best of these (like *Audacity*) handle multi-channel sound for recording, mixing, and arranging high-quality performances. See handout **B1-2**.

d. CD recorder ("ripper") programs, that automatically read an audio CD in your CD-ROM drive, convert its tracks into MP3 files, and save to your hard disk. *MusicMatch* and *Windows Media Player 10* combine the functions of a sound player, CD ripper, and CD-R burner, plus it looks up CDs in the on-line CD Data Base (CDDB) for album names and song titles. See handout **B6**.

e. Sound visualizers. These programs display the frequency components of sound files. *Audacity* includes a Spectrum display option for this purpose. *SoundView* (for Mac) and *SpectroGram* (for PC) work in real-time and are fun to watch. Useful for understanding the structure of complex sounds.

f. Synthesizer programs. These complex programs are intended to create interesting sounds, for sound effects or for creating original electronic musical instruments.

B. Music programs

a. **MIDI players.** A program for playing MIDI files (file extension ".MID"): The better ones let you change the tempo, key, instruments, and the volume of each instrument. See *Sweet MIDI Player* in handout **B7**.

b. **MIDI sequencers.** These programs act like a multi-track recorder for MIDI-capable musical instruments, e.g. electronic keyboards, drum pads, or other instruments that can hook up to the computer. They allow you to recored each track separately, then play them back all at once, adjusting the balance, tempo, key, and instrumentation as desired: a kind of electronic "one-man (or one-woman) band". Example: *PowerTracks* in the "Windows software" folder.

c. **Music notation programs/Score editors**: These are programs for writing (composing) music in Common Music Notation and printing out the sheet music. Most can save and play in MIDI format. One of the most famous is *Finale*. A demo version of a simpler program from the same company, *Finale Allegro*, is included in the Windows and Macintosh software folders.

d. **Music accompaniment generators**. These programs generate the sound of a "rhythm section" or "backup band" (e.g. piano, bass, drums, guitar) to accompany a solo performer or singer. You type in the chords to the song and choose from a list of hundreds of available styles (e.g. jazz, rock, pop, country, latin, reggae, swing, etc). Useful for for composing songs and practicing improvisation. Example: *Band in a Box* (in "Music accomp. program" in the Windows and Mac software folders).

e. **Karaoke programs**. A karaoke player program will read karaoke songs in .KAR format and display the lyrics synchronized with the music accompaniment. See "Computer Karaoke", handout **B7-8**.

Six different ways to represent 50 seconds of music as a computer file

(J. S. Bach's *Two Part Invention, #8*)

These files are stored in the "Sound file examples" folder on the Workshop CD-ROM

Formats based on sound waves:

TwoPartInvention.wav

8,685 KBytes (over 8 megabytes). A digital sound recording, in "Windows PCM (.wav)" format, digitized in stereo, 16 bits, 44 KHz sampling rate ("CD quality"). This is the largest file format. To listen to this file, just double-click on it; most modern computers have a sound player application that can handle this format. (File size calculation: 2 channels X 2 bytes/sample X 44,000 samples/sec X 50 sec. = 8600 kbytes).

TwoPartInvention.au

4,343 KBytes (over 4 megabytes). A digital sound recording, in ".au" format, digitized in stereo, 8 bits, 44 KHz sampling rate. This is about half the size of a 16-bit sound file (TwoPartInvention1.wav) but it sounds noisier because of the 8-bit digitization. To listen to this file, just double-click on it; most modern computers have a sound player application that can handle this format. (File size calculation: 2 channels X 1 byte/sample X 44,000 samples/sec X 50 sec. = 4300 kbytes)

TwoPartInvMono8bits11KHz.wav

546 KBytes. A digital sound recording, in "Windows PCM (.wav)" format, digitized in mono, 8 bits, 11 KHz sampling rate. This is an attempt to reduce the size of a WAV file by sacrificing audio quality. Note the poor sound quality, compared to the mp3 file (below) that is not much larger. To listen to this file, just double-click on it; most modern computers have a sound player application that can handle this format. (File size calculation: 1 channel X 1 byte/sample X 11,000 samples/sec X 50 sec. = 550 kbytes)

TwoPartInvention.mp3

789 KBytes. A digital sound recording, digitized in stereo, 16 bits, 44 KHz sampling rate ("CD quality") and converted into the highly-efficient "mp3" format. Note that this format preserves almost all of the quality of the original .wav file but is less than one-tenth the size. To listen to this file, just double-click on it; most modern computers have a sound player application that can handle this format. (The file size is about 1 MByte/minute). **TwoPartInventionReverb.mp3** is the same file with a reverberation effect added using *Audacity*.

Formats based on musical notes:

TwoPartInvention.mid

5 KBytes. A MIDI file contains only the notes used in this music; it does not record the actual sound of a particular performance. When the computer plays the file, it combines the musical note information in the MIDI file with the sounds of musical instruments stored in the sound card to produce a performance of that piece. Because the instrument sounds are not in the file, it is a very compact format (almost 2000 times smaller than a CD-quality digital sound recording of this piece in WAV format). To listen to this file, just double-click on it; modern computers have a sound card that can handle this format. "TwoPartInvention.mid" was created by typing in the notes into a score editor program and saving in MIDI format; "InventionLive.mid" is the same piece recorded live by a pianist playing on a MIDI-interfaced piano. Can you hear the difference?

TwoPartInvention.etf

124 KBytes. A score editor document created by entering the notes into the *Finale Allegro* score editor program and saving it as an ETF (Enigma Transportable Format) file. This is essentially the "sheet music" for this piece, including not only the notes themselves but also the staves, clefs, note stems, title, and other details of music typography. Note that it is larger than the MIDI file but much smaller than any of the digital sound recording formats. You won't be able to open up this file unless you have installed the *Finale Allegro* program (the installer is in "Finale Allegro score editor" in the "Windows software" folder). (Any computer can open up and print **TwoPartInvention.pdf**, the *Adobe Acrobat* version, but the computer can't play the PDF file.)

Sound and Music File Formats

A. Formats based on sound waveforms

These formats are essentially digital sound recordings - the digital equivalents of tape or disk recordings. You can easily make your own digital sound recordings using only a microphone and a sound recorder or editor program. A digital sound recording may be *mono* or *stereo*, have *8* or *16* bits, and may have any of several *sampling rates*. When you digitize your own sounds using a sound recorder program, you can choose these parameters. Each of these have an influence on the size of the resulting computer file and on the quality of the sound. Stereo recordings have two channels (left and right) and take up about twice the disk space of a mono (single channel) recording. A 16 bit recording takes about twice the disk space of an 8-bit recording, but the sound quality and dynamic range is better. The most common sampling rates are 11, 22, and 44 KHz; the larger the sampling rate, the larger the file size and the better the audio fidelity. For the best sound quality for music, use 16 bits and 44 KHz. Voice recordings can get by with 22 or even 11 KHz in order to produce smaller files.

Non-compressed formats: Some examples are WAV, AU, and AIFF. These files are often very large. A 3-minute song of CD-quality music (stereo, 16 bits, 44 KHz sampling rate) may take up 30 Megabytes. These file types can be played by virtually all current sound players. A sound editor program such as *Audacity* can read and write and convert between these formats.

MP3 (compressed) format: This format uses compression to reduce the file size of a digitized recording without degrading the audio quality. A 3-minute song song of CD-quality music (stereo, 16 bits, 44 KHz sampling rate) may be only about 3 Megabyte MP3 file. Some recorder programs that can record sound files directly in MP3 format or can convert non-compressed sound files into MP3. You can also use a CD-recorder program (such as *MusicMatch*) to automatically read an audio CD and convert its tracks into MP3 files and save them on your hard disk. MP3 files can be played by your computer's sound player or on portable MP3 players. *Audacity* can read and write MP3 format files.

B. Formats based on musical notes

These formats specify the music notes played in a musical performance. They are the digital equivalents of sheet music; they do not record the actual sound of a particular performance. These formats are used mainly for instrumental music.

MIDI format (file extension ".MID"): This is the most generic note-based format. It includes the notes, their duration and loudness, and the instruments used. MIDI files are very compact compared to the sound-based files of the same music - much smaller than any other format; a 3-minute song may be only a few Kbytes (v.s. a few Mbytes as an MP3 file). MIDI files can be played by most sound players of contemporary computers (e.g. MediaPlayer, Quicktime, WinAmp). The sound quality depends on the quality of the computer's sound card. Very old computers may not be able to play MIDI files. Some MIDI players allow you to change the tempo, musical key, and the instruments assigned to each part. To *record* a MIDI file, you need to have a MIDI-capable musical instrument, e.g. a keyboard, drum pad, or other instrument that can hook up to a computer running a MIDI sequencer program. With good-quality MIDI instruments, every nuance of a performace is recorded into the MIDI file: the exact phrasing, dynamics, and expression of each individual note, the action of the sustain pedals, pitch bends, etc.

Score editor formats: These are the proprietary formats of score-editor programs such as *Finale*. In addition to the notes and durations, these formats include the details of score typography (staves, clefs, stem directions, joined note tails, etc.). Using a score editor program, a musician can write music from scratch, then hear it played by the computer, print out the score parts, and save it as a MIDI file. However, a MIDI file created from a score will not have all the performance nuances of a live MIDI recording. For example, in the "Sound file examples" folder, compare "Moonlight1.mid", created from the score, to "Moonlight2.mid", created from a live recording on a MIDI piano. The notes and the tempo are exactly the same; can you hear a difference? Listen carefully - one sounds more mechanical and lifeless; the other sound more alive.

KAR format: A specialized format used for karaoke; it includes the song lyrics and the music accompaniment, often in MIDI format. A MIDI-karaoke player application (e.g. *WinKaraoke* in the "Windows software" folder) will read this format and display the lycics synchronized with the music accompaniment.

Setting up a home theater system for movies and music

The highest-quality movie viewing experience in the home is the DVD (Digital Video Disk). The picture and sound quality of a DVD movie is much better than a VCR tape and even better than most cable. DVD movies usually include interesting extra material that is not available anywhere else: "behind-the-scenes" documentaries, interviews with the actors and director, deleted scenes, etc. DVDs usually have easy-to-read subtitles in various languages and sometimes even audio tracks in other languages. In the last two years, the cost of DVD players have dropped dramatically.

1. DVD player. Most current DVD players now being sold will play DVD movies, audio CDs, and MP3 disks, and many models will also play disks with JPG photo files and homemade video disks in VDC and SVCD format. Some models are selling for as little as $30. Prices are dropping, so shop around. Look for models that play all the disk formats (DVD, DVD-R, DVD+R, audio CD, CD-R, MP3, VCD, SVCD, JPG), and that have "progressive scan" and (ideally) a volume control on the remote control. Combo DVD and VCR players are also sold.

   A recent development is the introduction in 2006 of the first high-definition (HD) DVD players and the release of the first HD movie titles. These give much higher picture quality that standard DVD players when viewed on a high-definition TV set. However, there are two competing standards, *HD-DVD* and *Blue-Ray;* it is not clear yet which one will become the standard in the future. Wait for the dust to settle and for prices to come down.

2. Television: You can use any TV with an external video input. If your current TV has an extra video input that is not currently being used by your VCR player, you can use the unused input for a DVD player. (If your TV has no video inputs, you can buy a low-cost "RF modulator" that will allow you to connect a DVD player, but if your set is that old, you'll get a better picture if you buy a new set). Wide-screen flat-panel sets, both the LCD and plasma types, are getting cheaper all the time and are available is several sizes in the $1200-2000 range. A high-definition (HD) model is best, but you must also upgrade your cable TV service to HD, which will cost a few extra dollars per month. And remember that most DVD movies currently are not yet HD.

   If an HD plasma screen is too much for your current needs, you can save a lot of money by buying a flat-*screen* (rather than a flat-*panel*) model - flat screen models look great and are *much* cheaper that flat-panel screens: 27" flat-screen sets go for about $250 -300 at any of the local consumer electronics stores (*Circuit City, Best Buys, Costco, Sam's Club*, etc). Make sure that you buy one with at least *two rear AV inputs* (for connecting the VCR and the DVD). (It's also nice to have a *front AV input*, for temporarily connecting a video or digital still camera to view on TV). New models are always coming out, and thankfully quality is going up and prices are going down all the time. Hint: *Ask the salesperson to show you how to switch between TV and the AV inputs*.

3. Speakers. For the best sound quality when playing DVD movies and music disks, add external speakers to your DVD player, rather than using the small speakers in the TV set itself. This also allows you to play audio CDs without turning on the TV. A good choice is a powered three-speaker system that has a "sub-woofer" (for bass sounds) in addition to small left and right side speakers. You can buy these at *Circuit City*, *Best Buys*, etc. *Altec Lansing* and other manufacturers make speaker sets that sound great and that cost only $20 - $40. Hook them up to the audio outputs on the back of the DVD player. You'll probably have to buy an adapter that will adapt the male 1/8" stereo phono plug on the speakers to the pair of female RCA jacks on the DVD player; you can get one at *Radio Shack* for about $5. (If you're planning to use external speakers hooked directly to your DVD player, choose a DVD player that has a volume control on the remote control, so that you will have a convenient way to control the volume when you are watching DVD movies or listening to audio CDs).

4. Hooking it up. Hooking it all up seems more complicated at first than it really is. There are three

ways to hook up a DVD to a TV. In the order of increasing video quality, they are:

a. Composite video. This is the simplest method. Most DVD players come with a cable that has a yellow male RCA plug at each end. You simply hook up this cable between the video output on the DVD player (usually colored yellow) and the video input on the TV (also usually colored yellow).

b. S-Video. If the DVD player has an S-Video output and your TV has an S-Video input, then you can get slightly better video quality by using an S-Video cable to connect these two rather than the composite video connection. You can buy as S-Video cable for about $10 at consumer electronics stores.

c. Component video. If the DVD player has component video outputs and your TV has component video inputs, then you can get even better video quality by using a component video cable to connect these two rather than composite or S-Video connection. A component video cable has three separate cables, each with a male RCA plug at each end. You can use three ordinary audio cables with RCA plugs. Make sure to match the inputs and outputs: connect the "Y" output to the "Y" input; "Pr" output to the "Pr" input, etc. Component video is required for high definition (HD).

d. Audio connections. No matter what video connection you use, you'll also have to connect the audio separately. On the back of the DVD player there will be two audio outputs: right channel (red) and left channel (white). Most DVD players come with an audio cable with color-coded RCA plugs for this connection. Use this cable to connect the DVDs audio outputs either to the TV's audio inputs (if you want to use the TVs little speakers) or to a set of external powered speakers, as described above in #3. For the best sound quality, use external speakers, and choose a DVD player that has a volume control on the remote control, so that you will have a convenient way to control the volume when you are watching DVD movies or listening to audio CDs.

5. Selecting the DVD player on the TV's remote control. Select the video input channel on your TV that corresponds to the input that the DVD player is plugged into. The procedure differs among TVs, but it is normally done by pressing the **VIDEO IN** or **INPUT** button on the TV's remote until you see the DVD player's picture appear on the screen. On some TVs this is done by pressing the channel change button to put the TV on the correct channel for the DVD player (often a channel below channel 2) or by pressing the video selection button on the TV set itself. Before you buy a TV set, it's good idea to ask the salesperson how to switch between regular TV and the external video inputs. If he has trouble with it, maybe you will to.

6. Surround Sound. For the ultimate listening experience when watching movies, add a surround-sound system to your DVD movie setup. These sell at consumer electronics stores for $100 - $500 under the name "Home Theater System" or "Surround Sound System". They consist of 5 or 6 speakers (center, left-front, right-front, left-rear, right-rear, and sub-woofer) and an amplifier that might contain also a DVD player. These are a bit time-consuming to install, because of all the speakers and wires that have to be placed around the room. For some people, this is overkill; the difference between a surround sound system and a simpler, cheaper external 3-speaker system is noticeable only on certain movies that make good use of the surround-sound capabilities.

 Note: If your DVD movie skips, jumps, or breaks up, it might be dirty. Eject the disk and inspect it. If it looks dirty, clean it by washing it with clean water and drying it carefully with a clean dry soft towel. Wipe straight across the disk, not in a circle.