Composition: Electronic Media II
Spring 2005
Sine Wave Synthesis in Max

1. Prepare to launch **Max/MSP** as follows:
   a) Bring up mixer faders 1,2, 9, 10.
   b) Assign the faders to the desired buses and output channels.

2. Launch **Max/MSP** by selecting its icon in the **dock**.
   a) Select **Apple Menu>Process/Synthesize>Max/MSP**
   b) A **Max** window like the one below will appear. It is used only for messages.
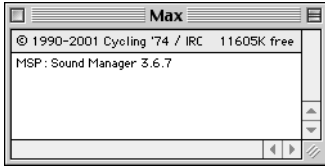
3. Open a new **Patcher Window** as follows:
   a) Select **File>New Patcher**
   b) An untitled window like the one below appears
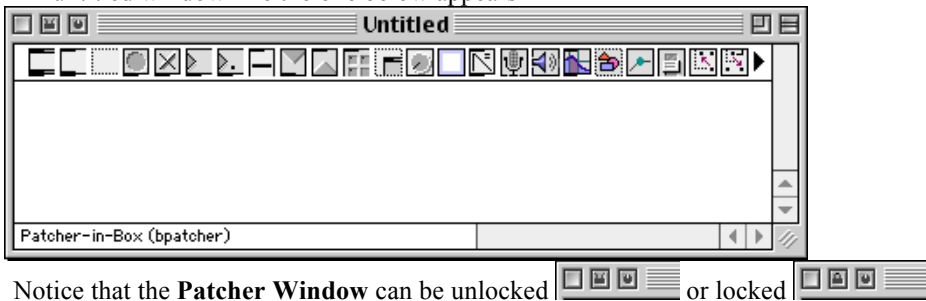
   c) Notice that the **Patcher Window** can be unlocked or locked
   d) When the window is unlocked, the patch can be created or edited.
   e) When the window is locked, the patch can be played.

4. Notice that the unlocked **Patcher Window** displays a series of icons along the top. These icons are the **Object Palette**. Several important objects are:

    Object Box. Creates Max or MSP objects. Notice inlets on top and outlets on bottom.

    Message Box. Used for Messages like "Start", "Stop", "Open". Notice inlet on top and outlet on bottom.

    Comment Box. Used for comments like "Larry's Patcher". Notice no inlet or outlet.

    Button. Used to trigger events with Bang messages. Notice outlet on bottom.

    Toggle. Used to toggle between states such as "on" and "off". Notice outlet on bottom.

    Number Box. Used to generate numbers (integers—whole numbers). Notice inlet on top and outlet on bottom.

    Float Number Box. Used to generate decimal point numbers (such as 1.112). Notice inlet on top and outlet on bottom.

5. Create a basic sine wave patch, as shown below:

```
cycle~ 440.0    object box

toggle □ [*~ 0.5]  object box

        [dac~]    object box
```
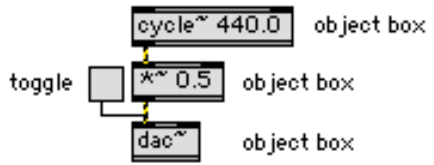
Note the following:
a) "dac~" is created by dragging an object box from the pallette into the patcher window. Type "dac~.".
   Recall that "dac" stands for "digital-analog-convertor." It sends Max audio to the computer audio output.
b) The toggle is patched into the left inlet of "dac~". The toggle turns the dac on and off. Note that the patch   is black, denoting a control signal.
c) "*~ 0.5" is an object box. Drag this from the pallette and patch its left outlet into the left inlet of "dac~".
   Note that the patch cord is yellow and black, denoting audio. Type "*~ 0.5". This gives an amplitude of 0.5 on a scale of 0 to 1.
d) "cycle~440.0 is an object box. Drag this from the pallette and patch its left outlet into the left inlet of "*~ 0.5".
   Note the yellow and black audio patch cord. Type "cycle~ 440.0. This creates a 440 hz sine wave.
e) To play, lock the patcher and turn the toggle on and off.

6. Create a sine wave patch with realtime frequency and amplitude control, as shown below:

```
▷0.     float number box

[cycle~]

    ▷0.47  float number box

□ [*~]

[dac~]
```
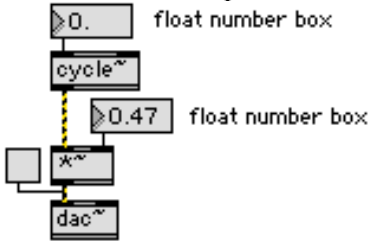
Note the following:
a) The left outlet of the float number box (here, 0.47) is patched into the right inlet of the "*~" box. The float
   Use the float number box scroll function to change the amplitude of the sound from 0… (watch out). Position the
   cursor to the left of the decimal to change the integer. Position the cursor to the right of the decimal to change the
   decimal value.
b) The left outlet of the float number box (here, 0.) is patched into the right inlet of the "cycle~" box. Use the float
   number box scroll function to change the frequency of the sine wave from 0.0…

7. Create a sine wave patch with realtime pitch control, as shown below:

```
[1.0595] [▷13]   number box

[pow]

[▷2.12]

[* 440.0]

[▷932.74957]

[cycle~]

       [▷0.11]

□ [*~]

[dac~]
```
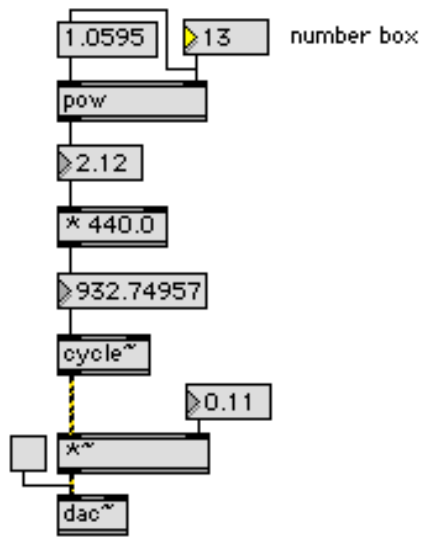
Discussion points:
a) Frequency to pitch conversion.
b) Math in Max.