# Wingeom and Winplot
## Using Peanut Software to Create Pictures for LaTeXDocuments

Peanut software has several useful programs which you can use to include pictures in your LaTeXdocuments. These programs are free. Moreover, the programs do not need to be installed on your computer (that is to say, you will not need to get help from a Math Sciences administrator to put these programs on your computer.)

To get copies of Wingeom and Winplot

1. Make a directory for Peanut Software. My directory is named named *peanut*. (Clever, huh?)

2. Go to `http://math.exeter.edu/rparris/default.html`.

3. Click on Wingeom (Winplot).

4. Click on Wingeom (Winplot) on the next page.

5. Save the file in the *peanut* directory.

6. Click on the icon for the file you just saved. (wg32z.exe or wg32z.exe). This will create a new Wingeom (Winplot) icon. You can click on this new icon to run Wingeom (Winplot).

Wingeom is handy because it can draw all kinds of geometric figures: lines, circles, regular polygons, etc. You can also specify the measures of angels and line segments. It even has some 3-D and animation capabilities and has built-in diagrams of certain common tilings. (I haven't done anything with the animation, but I have seen some examples.) You can use Wingeom to draw almost any picture involving points, lines, circles, and polygons.

Winplot is about the **easiest** way to include a graph in a LaTeXdocument that I have found. In 2-D, you can enter an equation in explicit, parametric, implicit, or polar form. You can also draw points, line segments, vector fields, 3-D graphs, and likely some other things that I haven't discovered yet.

There are a lot of similarities between Wingeom and Winplot. I am going to describe Winplot in a little more detail than Wingeom, because it is likely you will need to draw more graphs than geometric diagrams for the Algebra and Calculus classes many of you teach. I will, however, tell you about a few specific things I have found to be helpful when working with Wingeom.

**Winplot**

I think the best way to learn Winplot is to work through a simple example.

1. Click on the Winplot Icon.

2. Select *2-dim* from the **Window** menu.

3. Select *Parametric...* from the **Equa** menu.

4. There is already a sample equation given, but let's change the equation. Set $f(t) = \sin t$ and $g(t) = -\cos t$. Right now, we are ready to graph $x = \sin t$, $y = -\cos t$ for $0 \le t \le 2\pi$, but let's change things a bit more. Check the box beside *polar*. Now we are going to graph $r = \sin t$, $\theta = -\cos t$ for $0 \le t \le 2\pi$. That is, we have parametric equations in polar coordinates. Click *ok*. You should now see the following picture.
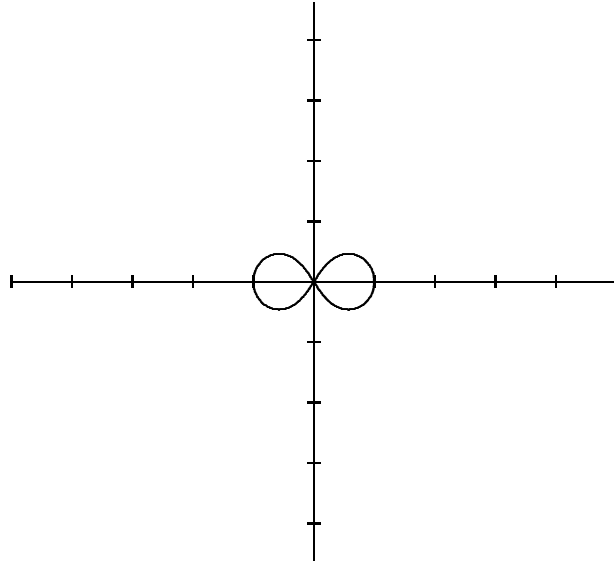


5. Now let's modify this picture a bit. First let's change the viewing window. To do this, choose *View...* from the **View** menu. Let's set the viewing window to $-3 \le x \le 3$, $-2 \le y \le 2$. In the view box, change *left* to $-3$, *right* to $3$, *down* to $-2$, and *up* to $2$. Click on the button beside *set corners*. Click *apply*. Now your picture should look like this.
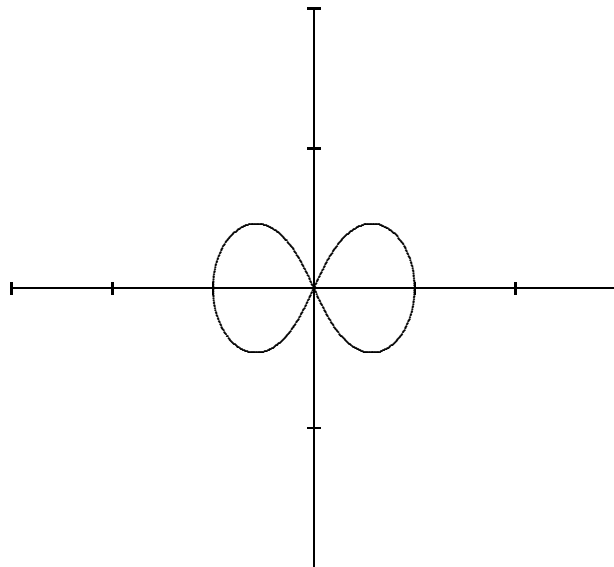
6. Now let's add some text to this picture. Let's place a 1 at the first marker on the $y$-axis. To add text to a diagram, select *Text* from the **Btns** menu. Now you can right click to add text to the graph. Right click on the graph. Type a 1, and click on *ok*. Now left click on the one to move it to the desired position. Follow this procedure to place a 2 at the second marker on the $x$-axis. Your picture should now look like this.
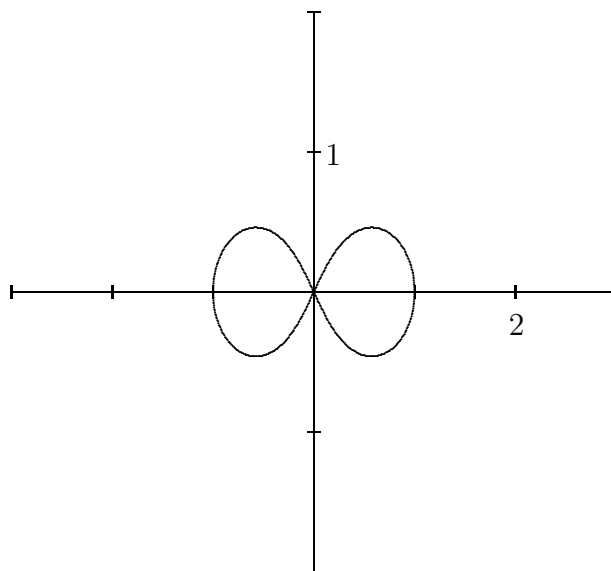


7. Now let's save the file. First we will want to save it as a Winplot file (*.wp2*) so that we can modify it later if necessary. To do this select *Save as...* from the *File* menu. For now, let's name this file *samplepic*; the program will automatically add the extension *.wp2*. Now we need to save it in a form that can be included in a LATEXdocument. To do this, select *PicTeX file...* from the **Misc** menu. For consistency, let's name this file *samplepic* as well; the program will automatically append the extension *.tex*. Click *Save*. This will bring up a *PiCTeX setup* box. Choose *TeX insertable* and click *ok*. You now have a picture file that can be included in a LATEXdocument.

8. To include TeX insertable pictures from Wingeom or Winplot, you will need to add the line

   ```
   \usepackage{pictexwd}
   ```

   in the preamble. You can then include *samplepic* by typing

   ```
   \begin{center}
   \mbox{\input{samplepic}}
   \end{center}
   ```
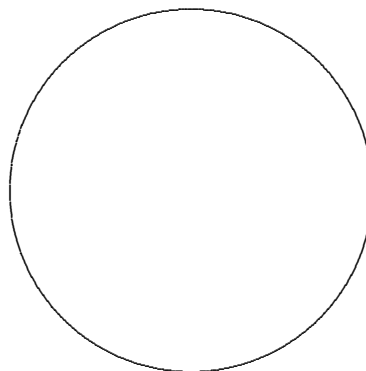
**Wingeom**

These are just a few of the things I ran into when working with Wingeom.

1. Go to a 2-dim window. The **Btns** menu changes the function of the mouse. You can see a description of the different functions by selecting *Help* from the **Btns** menu. Incidentally, every menu has a *Help* option which is very handy.

2. Wingeom automatically labels the points you use to specify figures. Moreover, the points show up in the PiCTeX diagram as little circles, as shown in the diagram below.

*B*

*A*
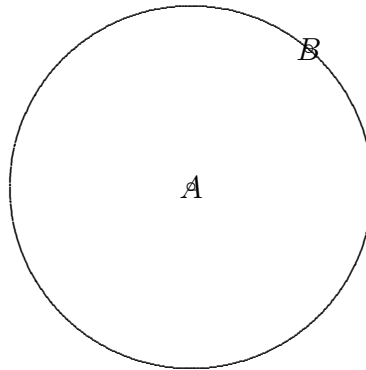
To hide the labels and the circles, select *Labels* from the **Edit** menu and choose *Individual...*. List the vertices that you want to hide, select *no mark* and uncheck the box beside *show label.* This produces the following picture.

Those where the two big problems I had when I got started with Wingeom. If you have any other questions, let me know and I will see what I can do to help.