Special Topics -- Computer Graphics

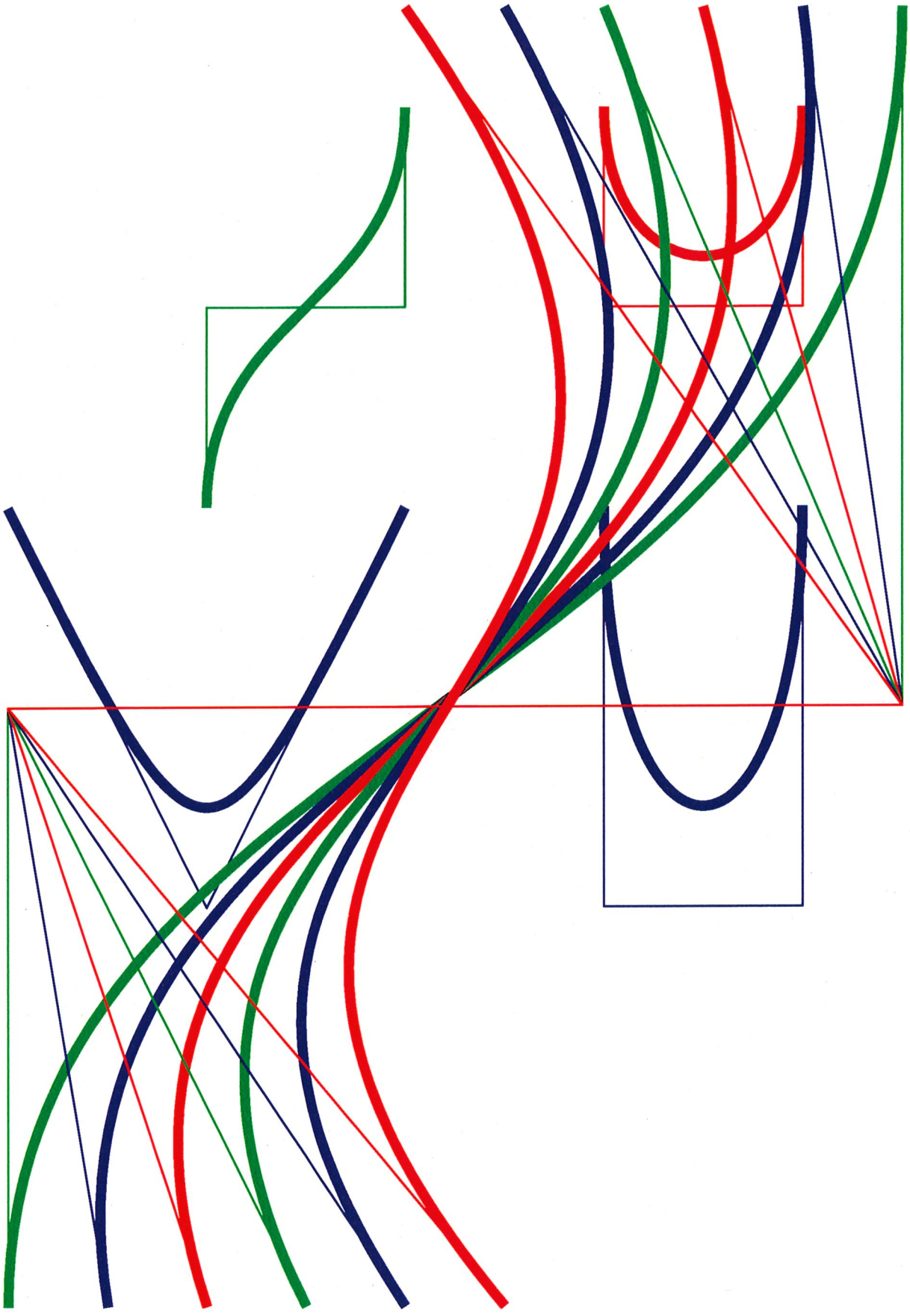
MAT 5932-01 (Currently listed for MW 3:35-4:50 but will meet a few minutes later (perhaps as many as 25 minutes).)

Yes computer graphics! This graduate course is designed for Mathematicians and will spend alot of time 'in the lab' using some of the graphical packages owned by the department. The theme will be 3 Dimensional graphics. We will look at 3-D viewing from a number of different viewpoints. For example, Iris 3-D viewers (based on open Inventor/Explorer), scientific visualation packages (Sci-An), geometry packages (Geoview), 3D ploting in Mathematica, Maple and Matlab, with a bit of computer graphics theory and a dash of computational geometry to keep the good doctor happy.

The textbook, "An Introduction to Computer Graphics Concepts, from Pixels to Pictures" is a good "executive level" dictionary of graphics concepts at an a "graduate student level" price of $22.

Prerequisites: Graduate Standing in Mathematics or permission of the instructor (Bellenot, email bellenot@math.fsu.edu)

- Some Graphic Things on the Web
  - My 3D demo's (requires netscape 2.0 or HotJava viewer)
  - Math Visualization
  - OpenGl
  - Open Invento r
  - The Geometry Center
  - comp.graphics.algorithms Frequently Asked Questions (FAQ)
  - A Graphics Web Page
- See also the things in ~bellenot/3D (not available via the web)

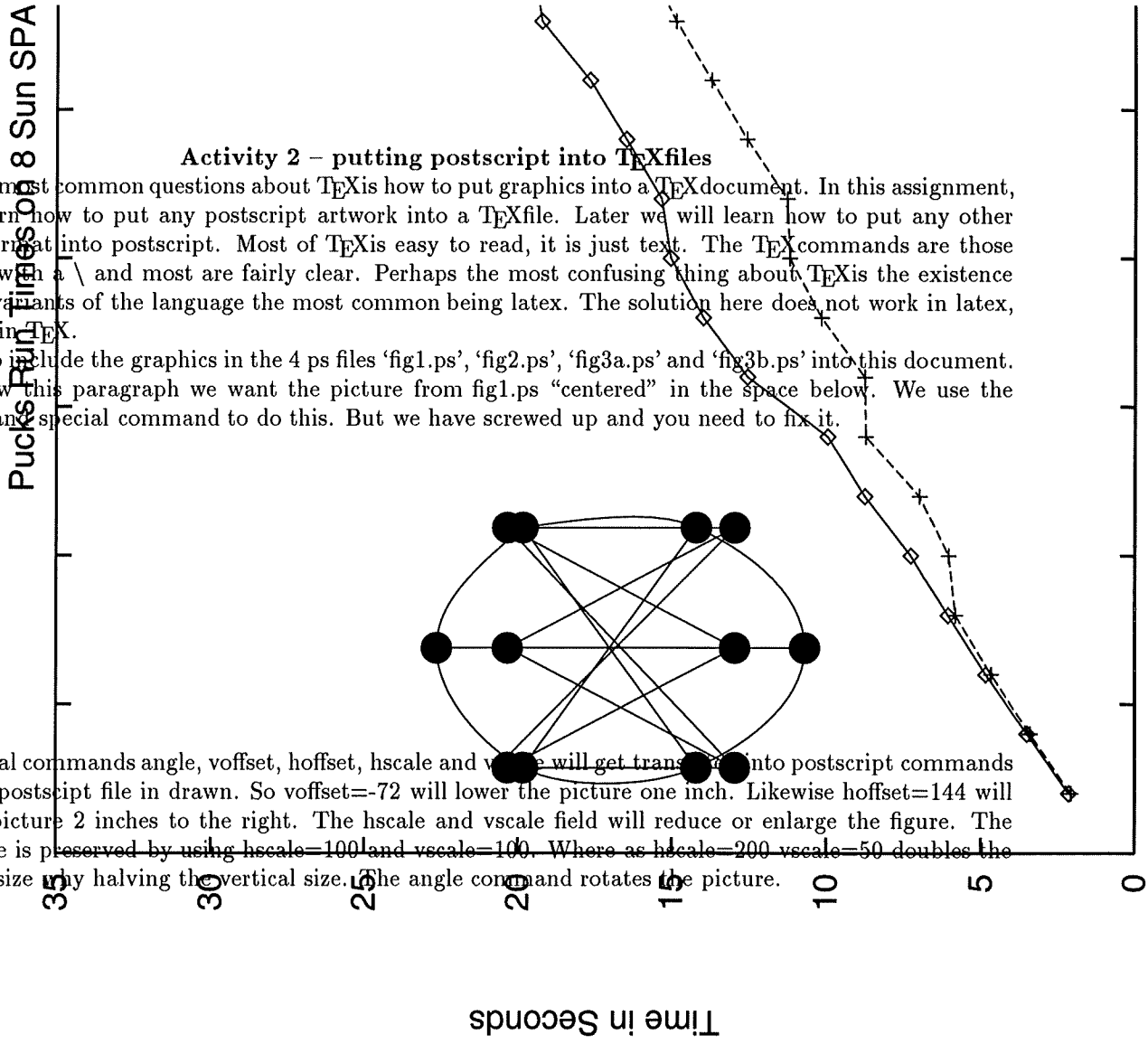


Postscript.

Draw a circle using only straight lines. (aka a regular n-gon). Find n so that the circle looks like a circle. Center the circle on the page and check your n for different radii.

You might want to write a c++, c or fortran program to generate the postscript and use gs or ghostview to view the postscript. (Don't use up your print quota on this.)

The good doctor's solution:
1. Look at the c++ file circle.cc
2. Compile with the command 'make circle'
3. run with the command './circle | gs > /dev/null'
4. It prompts for n, and draws the circle
5. stop the program with ^C.



Activity 2 – putting postscript into TEXfiles

One of the most common questions about TEXis how to put graphics into a TEXdocument. In this assignment, we will learn how to put any postscript artwork into a TEXfile. Later we will learn how to put any other graphics format into postscript. Most of TEXis easy to read, it is just text. The TEXcommands are those preceeded with a \ and most are fairly clear. Perhaps the most confusing thing about TEXis the existence of several variants of the language the most common being latex. The solution here does not work in latex, only in plain TEX.

We want to include the graphics in the 4 ps files 'fig1.ps', 'fig2.ps', 'fig3a.ps' and 'fig3b.ps' into this document. Right below this paragraph we want the picture from fig1.ps "centered" in the space below. We use the midinsert and special command to do this. But we have screwed up and you need to fix it.

The optional commands angle, voffset, hoffset, hscale and vscale will get translated into postscript commands before the postscipt file in drawn. So voffset=-72 will lower the picture one inch. Likewise hoffset=144 will move the picture 2 inches to the right. The hscale and vscale field will reduce or enlarge the figure. The original size is preserved by using hscale=100 and vscale=100. Where as hscale=200 vscale=50 doubles the horizontal size while halving the vertical size. The angle command rotates the picture.

The most common problem with this is that the initial postscript picture doesn't show. TEXmoves the origin (0,0) location for postscript to be where the next text line would start. A postscript picture too high will be printed above the page. An inital large negative voffset might be needed to see the figure. The last problem is to put two pictures side by side.

To tex this file do 'tex activity2.tex' to change the output into postscript do 'dvips activity2.dvi' and then view the postscript file with gs or ghostview.

Play around with the geometry option on many x-windows clients.

try xbiff with a geometry too small, too large, too far to right or
bottom.

Run xbiffs on a number of different machines using xhost and display.
set yourself mail, which host is faster?

xbiff -t hostname -g "xsize"x"ysize"+"xloc"+"yloc"

the + signs could also be minus signs.

```
#! /bin/sh
xsize=30
ysize=60
xloc=0
yloc=0
#xserver=`uname -n`:0.0
xserver=$DISPLAY
for client in gauss taylor rene hardy galois
do
        #xhost $client
        rsh $client "setenv DISPLAY $xserver; /bin/X11/xbiff -t $client -g ${xsize}x${ysize}+
        xloc=`expr $xloc + $xsize`
        yloc=`expr $yloc + $ysize`
        xsize=`expr $xsize + 50`
        ysize=`expr $ysize + 20`
done
```