Polar and 3D Graphing

Homework Set 5

1. Draw the coordinate axes and plot the points: A(0,0,2), B(0,2,0), C(2,0,0), D(2,3,0), E(3,2,4), F(-2,0,4), G(-1,-1,-1), H(2,1,-2)
2. Draw a cube which has the origin and the point (4,4,4) as opposite corners. Write the coordinates of the other corners.
3. Draw the edges of a box which has four of its vertices located at the points (0,0,0), (3,0,0), (0,2,0), and (0,0,2). Write the coordinates of the other vertices.
4. Draw the rectangular parallelepiped which has three of its faces in the coordinate planes and the points (0,0,0) and (4,5,3) as the ends of a diagonal. Write the coordinates of the vertices.

Describe the surface corresponding to each equation 5 through 24 and make a sketch of the surface.

7. $z = 0$
10. $x + y = 4$
19. $x^2 = 9z$
21. $(x-2)^2 = 8y$
22. $4x^2 + 9y^2 = 36$
23. $x^2 + z^2 - 4x - 6z + 9 = 0$

Homework Set 6

Identify and sketch each quadric surface.

7. $\frac{x^2}{9} + \frac{y^2}{4} + \frac{z^2}{16} = 1$
9. $x^2 + y^2 + z^2 = 16$
11. $\frac{x^2}{9} + \frac{y^2}{16} - \frac{z^2}{4} = 1$
13. $x^2 + y^2 - z^2 = 16$
15. $\frac{x^2}{16} - \frac{y^2}{9} - \frac{z^2}{4} = 1$
17. $\frac{x^2}{9} + \frac{y^2}{4} = 2z$
19. $y^2 + z^2 = 4x$
21. $\frac{x^2}{9} - \frac{y^2}{16} = \frac{z}{4}$
23. $\frac{x^2}{16} + \frac{y^2}{9} = \frac{z^2}{4}$

3D Graphing Packet (to be done in class on days 7 and 8)

For these exercises you will be using the program Grapher (creative name huh?). This program is very adept at graphing 3-D surfaces and allows you to rotate the axes to get a better view.

A. Start by putting in the plane z=1. Play around with rotating the axis.
How do you stop the axes from rotating?_____

Practice dragging the graph to get a better view. How can you tell which axis is which? _____

_____

B. Now let's graph some other plain planes. For each of the following, list the 3 intercepts, and draw a sketch of the plane. You might have to change the window to get a better view. You can do this in the lower right hand corner of the input screen. Check out the handy quick zoom buttons in the lower left also.

Graph	Intercepts	3-d sketch
a) x+3z=10		
b) 2x+3y+5z=10		

c) $-3x+3y+2z=12$

d) $2x-5y+3z=15$

What is the generic form for a plane? (use letters as coefficients)_____

How does letter "a" from above differ from the others graphically?_____

What would $y+3z=10$ look like in 3-space? think!_____

True or False: $x+y+z=0$ would be a "degenerate" plane (just a point)?_____
Check your guess now with the computer.
Explain why the question is true or false_____
_____

C. For the next section you will be working with graphs that fit into one of the following 6 categories. The first part will involve graphing and cataloging them. Then you will make some rules for classifying them.

Ellipsoid

Elliptic Paraboloid

Hyperbolic Paraboloid (saddle)

Eliptic cone

Hyperboloid of One Sheet

Hyperboloid of Two Sheets

For each of the following, graph using the computer, name the graph, and tell which way the graph is oriented (e.g. opens along positive x-axis, longest along the y axis etc..)
For some of these you might need to alter your window to get the best picture.
For exponents use the ^ key (shift 6)

	name	orientation (e.g. opens along z-axis)	
$z^2-5x=-5y^2$			
$x^2+y^2=12z$			
$x^2+y^2+15z=16$			
$2x^2+3z^2=-36y$			
$z=x^2-y^2$			
$49z^2-100y^2=4900x$			
$144x^2-36y^2=5184z$			
$20y+1=7x^2-7z^2$			
$z^2=10-x^2-y^2$			
$z^2=-10-x^2-y^2$			
$5x^2+3y^2+2z^2=50$			
$z^2=x^2+y^2$			
$3y^2=x^2+z^2$			
$2z^2=3x^2+3y^2-12$			
$x^2=y^2+z^2-10$			