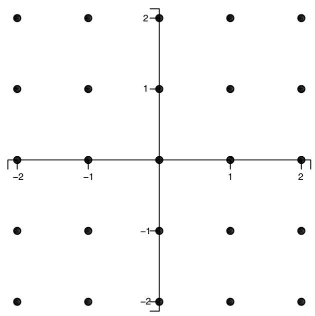
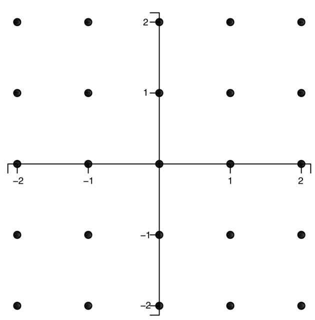
Math 303, Worksheet #13 **Name:** ____________________________
Fall 2008

1. Graph each of the following vector fields. Draw the corresponding vector for each dot.

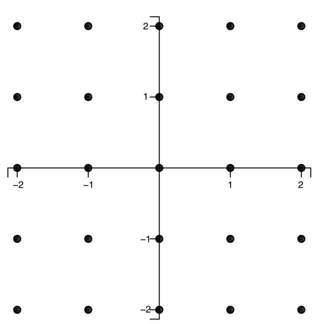
a. $\vec{F}(x,y) = (x+y)\vec{i} + (x-y)\vec{j}$



b. $\vec{G}(x,y) = y^2\vec{i}$



c. $\vec{H}(x,y) = y\vec{i} - x\vec{j}$



The Maple command for graphing a vector field $\vec{F}(x,y) = v_1(x,y)\vec{i} + v_2(x,y)\vec{j}$ is: fieldplot([v1,v2],x=a..b,y=c..d);

2. Check your work on page one by using Maple to graph each of those vector fields.

3. Use Maple to graph each of the following vector fields.

a. $\vec{J}(x,y) = y^2\vec{i} + x\vec{j}$

b. $\vec{K}(x,y) = xy\vec{i} + 3y\vec{j}$

c. $\vec{L}(x,y) = y^2\vec{i} + x^2\vec{j}$

d. $\vec{M}(x,y) = (x - y^2)\vec{i} + \vec{j}$

e. $\vec{N}(x,y) = \cos(y)\vec{i} + \sin(x)\vec{j}$

4. For each of the vector fields above, use your Maple graph and a little algebra to determine when the vectors are vertical, when they are vertical, and when they are 0.

Fortunately, we don't have to draw 3d vector fields by hand anymore. The Maple command for graphing the vector field $\vec{F}(x,y,z) = v_1(x,y,z)\vec{i} + v_2(x,y,z)\vec{j} + v_3(x,y,z)\vec{k}$ is:

fieldplot3d([v1,v2,v3],x=a..b,y=c..d,z=e..f);

5. Use Maple to graph each of the following vector fields.

a. $\vec{L}(x,y,z) = -y\vec{i} + x\vec{j} + z\vec{k}$

b. $\vec{M}(x,y) = x\vec{i} + (y - z)\vec{j}$

c. $\vec{N}(x,y) = z\vec{j} - x\vec{k}$

We've actually seen the idea of a vector field already: the gradient of a function of one or more variables is a vector field. Compute the gradient of each of the following functions, and then graph the gradient vector field.

d. $f(x,y) = x^2 + y^2$

e. $g(x,y) = x^2 - y^2$

f. $h(x,y,z) = xyz$

g. $k(x,y,z) = x^2 - yz$