Math 6b/c: Homework 13
Homework #13 is due January 21.

Equations and Graph Work

To draw a graph of an equation, chose a set of points x and find the corresponding y values. Draw the points on a graph.

Equation of a line

The line equation is usually denoted

$$y = ax + b$$

Where b is the intercept (value of y when $x = 0$)

Where a is the 'slope' (for a straight line)

$$slope = \frac{rise\ (change\ in\ y)}{run\ (change\ in\ x)}$$

(The changes in x and y are evaluated from the same pair of points.)

Distance between two points

The distance (d) between two points with coordinates (x_1, y_1) and (x_2, y_2)

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Homework

1. For each of the equations below, draw a graph of a line, then draw the perpendicular line to the one you just drew going through the origin (0,0). Write the equation corresponding to the perpendicular line.
(a) $y = 2x$
(b) $y = 3x$
(c) $y = -x$
(d) $y = \frac{1}{2}x$

Can you determine a general rule: if the slope of a line is k, the slope of its perpendicular is …

2. Draw the graphs of the following functions:
(a) $y = 2|x|$
(b) $y = |x+1|$

3. Find the distance between the following pairs of points in the plane (hint: Pythagorean Theorem)
(a) (0,0) and (1,1)
(b) (0,0) and (3,4)
(c) (0,0) and (-1,2)
(d) (2,2) and (3,3)
(e) (2,2) and (0,6)

4. Sketch graphs of the following functions:
(a) $y = (x - 1)^2 + 1$

(b) $y = \frac{1}{x+2} + 1$

(c) $y = \frac{1}{2-x}$

(d) $y = |x|$

(e) $y = \frac{x+2}{x+1}$

(f) $y = |x + 1| + |x - 1|$

(g) $y = \left| \frac{1}{x-1} + 1 \right|$

6. Is it possible to draw a curve which would intersect each of the sides of a 1001-agon exactly once? The line should not go through any of the vertices of the 1001-agon.

7. How many ways can one write the number 1000000 as a product of 2 factors, each different from 1? What about 3 factors? (Note that factorizations which only differ in the order of factors are considered the same factorization)