

Math 6a/b: Homework 13  
Homework #13 is due January 20.

## ***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)

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

(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)