Math 32, Spring 2010, Section 101
Worksheet 2

Work through the following problems in groups of about three. Take turns writing; everyone should get a chance to write for some of the problems. It's more important to understand the problems than to do all of them.

1. Evaluate or simplify each expression:

   (a) $4 + |-4|$ (c) $|-2 + 4|$ (e) $\left|1 - \sqrt{2}\right| + 1$

   (b) $2 - |-2|$ (d) $||-7| - |-9||$ (f) $\left|-\sqrt{3} + \sqrt{5}\right|$

2. Rewrite each expression using absolute value notation:

   (a) The distance between x and 2 is at least $3/4$

   (b) The number y is less than 3 units from the origin

   (c) The sum of the distances of a and b from the origin is greater than or equal to the distance of $a + b$ from the origin.

3. Solve each equation

   (a) $2m - 1 + 3m + 5 = 6m - 8$ (c) $x^3 - 6x^2 + x = 0$

   (b) $(x - 2)(x + 1) = x^2 + 11$ (d) $y + 3 + \frac{2}{y-1} = \frac{2y}{y-1}$

4. A triangle in the Cartesian plane has vertices at coordinates $(1, 4)$, $(5, 3)$ and $(3, 1)$. What are the lengths of the sides of the triangle? Is it a right triangle?

5. Write equations for the following lines:

   (a) The line through $(3, 5)$ and $(5, 11)$.

   (b) The line through $(10, 9)$ and $(12, 9)$.

   (c) The line through $(2, 2)$ that is parallel to the line $y = 7x + 13$.

   (d) The line through $(2, 2)$ that is perpendicular to the line $y = 7x + 13$.

[more on back]

6. You may have seen the triangle inequality $|a+b| \leq |a| + |b|$, which is true for all numbers a and b. For which values of a and b do we have $|a+b| = |a| + |b|$? Justify your answer.

7. Suppose r_1 and r_2 are the two real roots of $x^2 - 10x + 15$. What is their sum $r_1 + r_2$? How about their product $r_1 r_2$? (Hint: you don't need to find r_1 or r_2).

8. (a) Suppose I have two lines, $y = mx + b$ and $y = nx + c$. In terms of m,n,b and c, where do the two lines intersect?

   (b) If the two lines are parallel, they don't intersect. Why doesn't that contradict your answer to part (a)?

9. Consider the line segment joining the points $P(2, 3)$ and $Q(6, 5)$. Find the equation of the line perpendicular to the line segment $\overline{PQ}$ that goes through its midpoint.