

# Intro to Calculus

## Workshop 2

1. For each of the following:

(1) translate the algebraic statement into an English sentence about numbers on the number line using as “normal” sounding language as possible (avoid literal translations of the math symbols);

(2) describe the numbers that satisfy the given condition using a number line graph and interval notation (if possible).

a.  $|x - 3| < 8$

e.  $|x - 3| = -2$

b.  $|x - 5| < 8$

f.  $|x + 4| \leq -3$

c.  $|x + 6| \geq |x|$

g.  $|x - 8| \leq 0$

d.  $|x - 5| = |x + 2|$

2. For each of the following:

(1) translate the English sentence into an algebraic statement about numbers on the number line;

(2) describe the numbers that satisfy the given condition using a number line graph and interval notation (if possible).

a. The distance between  $x$  and 8 is less than the distance between  $x$  and 5.

b.  $x$  is closer to -5 than it is to 7.

c.  $x$  is no more than 5 units away from -1.

d. The distance from  $x$  to 3 is at least as much as the distance from  $x$  to 0.

e.  $x$  is closer to 7 than  $-x$  is to -4.

3. Write an expression using absolute value signs that has the following as its solution.

a.  $[-3, 3]$

b.  $(-7, 11)$

c.  $(3, \infty)$

d.  $(-\infty, 6]$

e.  $(-\infty, -1) \cup (5, +\infty)$

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4. a. Where does the circle  $(x + 3)^2 + (y - 5)^2 = 20$  intersect the  $y$ -axis?
  - b. What is the location of all of the points which are  $\sqrt{20}$  units away from the point  $(-3, 5)$  and whose  $y$ -value is twice the opposite of its  $x$ -value?
  - c. Is the point  $(-6, 2)$  inside the circle described above or outside it? Justify.
5. Find an equation for a circle that has its center on the  $y$ -axis, that has a radius of 4, and that has only one point on it whose  $x$ -coordinate is the same as its  $y$ -coordinate.
6. Two circles are symmetric across the  $y$ -axis. The points  $(7, 5)$  and  $(3, 1)$  are on of endpoints of a diameter of one of the circles. What are the equations of the circles? Use a graph to help justify.
7. A circle with a center at  $(4, 5)$  is first reflected across the  $y$ -axis and then across the  $x$ -axis. The point  $(-2, -6)$  is on this new circle. What are the equations of each of the circles and what is the equation of the line through the centers of the circles? Use a graph to help justify.