Math 95, HW 8 Section 3.5 Name: ______________________________

Concepts and Vocabulary:

In exercises 9 - 13 odd, determine whether the given values of x are solutions to the absolute value equation or inequality.

9. $|2x - 5| = 1$

   a. $x = -3$

   b. $x = 3$

11. $|7 - 4x| \leq 5$

   a. $x = -2$

   b. $x = 2$

13. $|7x + 4| > -1$

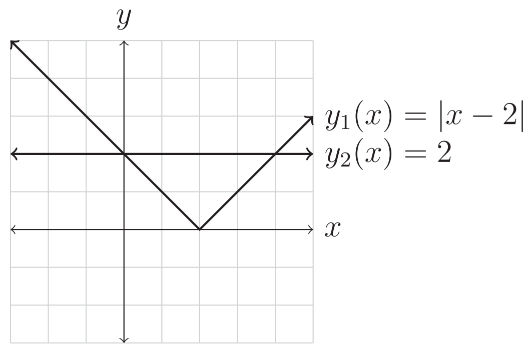
   a. $x = -\frac{4}{7}$

   b. $x = 2$

For exercise 15, use the graph to determine the set of solutions to the given equation.

15. $|x - 2| = 2$

    Let $y_1(x) = |x - 2|$ and $y_2(x) = 2$



Symbolic Solutions:

In exercises 27 - 45, solve the absolute value equation.

27. $|4x| = 9$

29. $|-2x| - 6 = 2$

31. $|2x + 1| = 11$

33. $|-2x + 3| + 3 = 4$

35. $|3 - 4x| = 0$

43. $|z - 1| = |2z|$

39. $|2x - 6| = -7$

45. $|3t + 1| = |2t - 4|$

In exercises 51, solve each equation or inequality.

51. a. $|5 - 4x| = 3$ b. $|5 - 4x| \leq 3$ c. $|5 - 4x| \geq 3$

In exercises 53 - 83 odd, solve the absolute value inequality. Write your answer in interval notation.

53. $|x| \leq 3$

69. $5 + \left|\frac{2-x}{3}\right| \leq 9$

61. $|2x| > 7$

75. $|2z - 4| \leq -1$

65. $2|x + 5| \geq 8$

79. $\left|\frac{2-t}{3}\right| \geq 5$

Numerical and Graphical Solutions:

In exercise 85, solve the equations and inequalities given numerically. State your conclusion using interval and set notation.

85. Let $f(x) = |-x+1|$ and $g(x) = 2$.

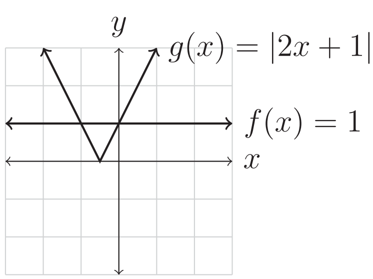
a. $f(x) = g(x)$

b. $f(x) < g(x)$

c. $f(x) > g(x)$

In exercise 87, use the graph of to solve each equation or inequality. State your conclusion to part a. using set notation. State your conclusions to parts b. and c. using interval notation and set notation.

87.



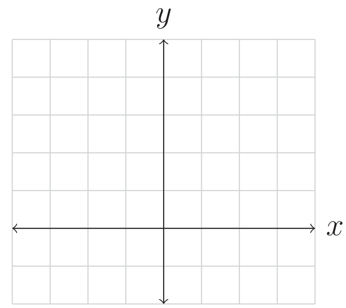
a. $|2x+1| = 1$

b. $|2x+1| \leq 1$

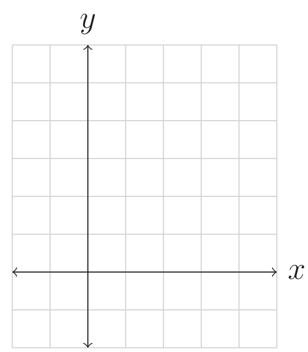
c. $|2x+1| \geq 1$

In exercises 89 - 97 odd, solve the inequality graphically. Write your answer in interval and set notation. Make sure and define your functions. A calculator may be handy for these.

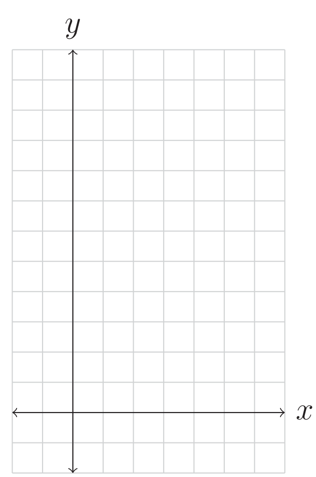
91. $|x - 1| \leq 3$



93. $|4 - 2x| > 2$



95. $|10 - 3x| < 4$



In exercises 99 and 101, set up a function to represent each side of the inequality and then solve the absolute value inequality numerically, symbolically, and graphically. State your conclusion using both interval and set notation.

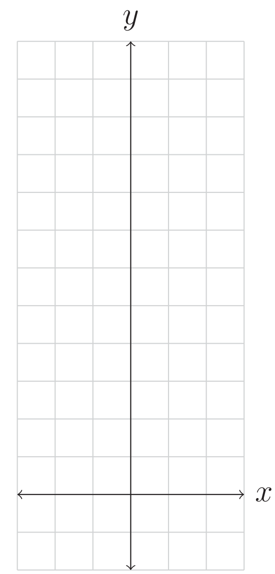
99. $|3x| \leq 9$

a. Numerically:

b. Symbolically:

$|3x| \leq 9$

c. Graphically:



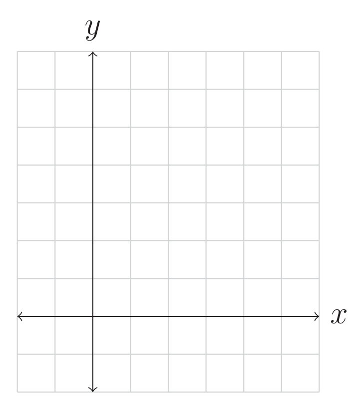
99. $|2x - 5| > 1$

a. Numerically:

b. Symbolically:

$|2x - 5| > 1$

c. Graphically:



Applications:

119. An engineer is designing a circular cover for a container. The diameter d of the cover is to be 4.25 inches and must be accurate to within 0.02 inch. An acceptable diameter d must satisfy the absolute value inequality

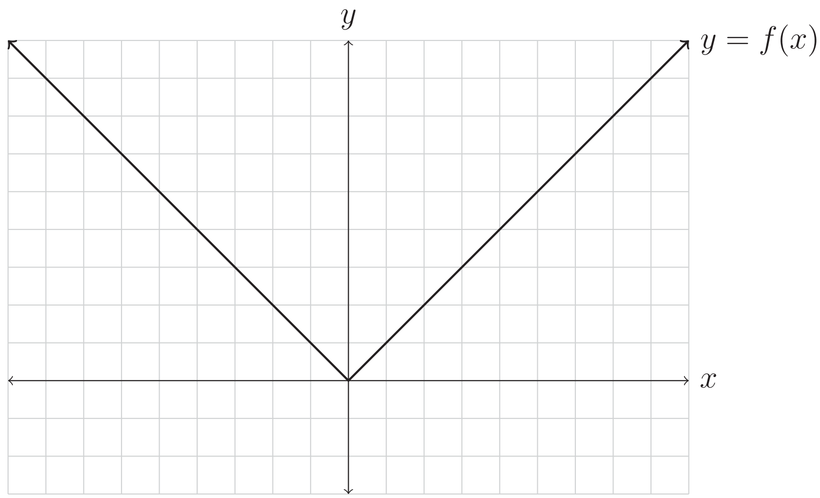
$$|d - 2.5| \leq 0.002.$$

Solve this inequality for d and interpret the result.

121. A circular lid is being designed for a container. The diameter d of the lid is to be 3.8 inches and must be accurate to within 0.03 inch. Write an absolute value inequality that gives acceptable values for d.

Supplemental Problem:

S1. Use the graph of $y = f(x) = |x|$ to answer the following questions. When solving equations state your solutions using set notation. When solving inequalities state the solutions using interval and set notation.



a. What is the domain and range of f?

c. Solve the inequality $f(x) < 5$.

b. Solve $f(x) = 4$.

d. Solve the inequality $f(x) \geq 3$.

e. Sketch $g(x) = |x - 3| + 2$ onto the coordinate plane above. State the domain and range of g using interval notation. Do the graphs of f and g appear to be related? If so, give a description of how.

Solutions to Supplemental Problems:

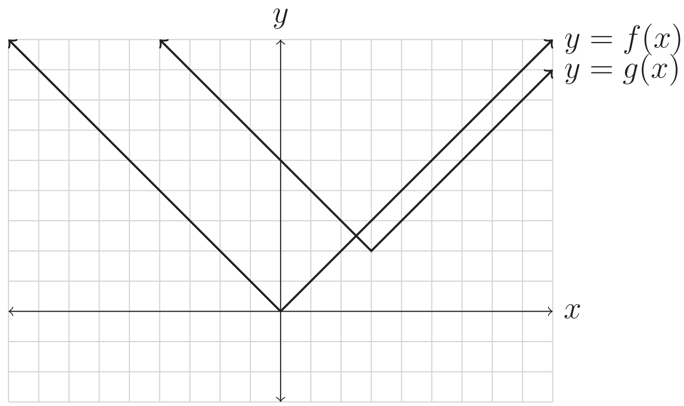
S1a. The domain of f is $(-\infty, \infty)$. The range of f is $[0, \infty)$.

S1b. The set of solutions is $\{-4, 4\}$.

S1c. The solutions are in the interval $(-5, 5)$. The set of solutions is $\{x| -5 < x < 5\}$.

S1d. The solutions are in the interval $(-\infty, -3] \cup [3, \infty)$. The set of solutions is $\{x|x < -3 \text{ or } x > 3\}$.

S1e.



The domain of g is $(-\infty, \infty)$. The range of g is $[2, \infty)$.

The function g looks just like f except shifted 3 units to the right and 2 units up.