

MTH 60, Fall Term 2010  
 Test 1 – Given November 17, 2010  
 Due: 2:30 PM, Monday, November 22

Name Key

You may not receive help of any kind with the problems on this test nor may you simply change the numbers and receive help with those similar questions. Work all of your practice homework questions and receive help with those before you even begin working on this test. Once you have started working on this test your window of opportunity to receive help is closed.

You may not talk with your fellow students about this test. You may not discuss your answers with one another nor may you show each other your answers.

Bottom line – do not cheat.

You may look at your notes and in your textbook while working on this test. Be mindful of the fact, however, that all of the new material covered on this test will also be covered on test 4 and the final exam. Both of those tests will be in-class and you will not be allowed to use notes or your text when taking those tests. Consequently, when you are working the practice problems (before working on this test) you need to do so with a mind towards eventually taking in-class tests over the material.

1. State the solution set to each of the following inequalities using interval notation. In each case state your answer using a complete sentence. (6 points)

a.  $x \geq 7$

The solution set to  $x \geq 7$  is  $[7, \infty)$ .

b.  $y < 0$

The solution set to  $y < 0$  is  $(-\infty, 0)$ .

c.  $-3 \leq t < 12$

The solution set to  $-3 \leq t < 12$  is  $[-3, 12)$ .

2. Answer each of the following questions showing your work and stating your conclusions in a manner consistent with that shown in class and on the keys posted on-line. (12 points)

- a. Drucilla was trying to sell her used Droid on Ebay. She set her minimum bid at \$60 and got no takers. She decided to decrease the minimum bid by 15%. What was the new minimum bid for Drucilla's used Droid?

$$\$60 - .15(\$60) = \$51.00$$

The new minimum bid for Drucilla's used Droid was \$51.00.

- b. Madelyn received a 10% pay raise at the mandolin shop. Madelyn's new wage was \$18.04/hr. What was Madelyn's wage before the pay raise?

Let  $x$  represent Madelyn's pre-raise wage

$$x + .10x = \$18.04/\text{hr}$$

$$1.1x = \$18.04/\text{hr}$$

$$x = \frac{\$18.04/\text{hr}}{1.1} = \$16.40/\text{hr}$$

Madelyn's wage before the pay raise was \$16.40/hr

- c. Scammers was having a "50% off sale" on scanners. The night before the sale, however, they raised all of their prices by 50%. What was the real percentage discount (from the original price) after the increase of 50% was followed by a 50% reduction in the higher price?

Suppose the original price was \$100.

After the 50% price boost the price was \$150.

After the 50% price reduction the price was \$75.

So Scammers "50% off sale" was really only a 25% off sale.

3. Find the solution set to the inequality  $3 - (x + 2) > 2 + 2(x - 2)$ . Show all relevant work. State the solution set using set builder notation. (8 points)

$$3 - (x + 2) > 2 + 2(x - 2)$$

$$3 - x - 2 > 2 + 2x - 4$$

$$1 - x > 2x - 2$$

$$1 - x - 2x > 2x - 2 - 2x$$

$$1 - 3x > -2$$

$$1 - 3x - 1 > -2 - 1$$

$$-3x > -3$$

$$\frac{-3x}{-3} < \frac{-3}{-3}$$

$$x < 1$$

The solution set  
is  $\{x \mid x < 1\}$ .

4. Find the solution set to the inequality  $5x - (2 - 3x) > 4 + 2(4x + 2)$ . Make sure that your conclusion is really clear. (7 points)

$$5x - (2 - 3x) > 4 + 2(4x + 2)$$

$$5x - 2 + 3x > 4 + 8x + 4$$

$$8x - 2 > 8x + 8$$

$$8x - 2 - 8x > 8x + 8 - 8x$$

$$-2 > 8$$

Well that's just not true at all.

There are no solutions to  $5x - (2 - 3x) > 4 + 2(4x + 2)$ ;  
the solution set is  $\emptyset$ .

5. The volume of a sphere of radius  $r$  is given by the formula  $V = \frac{4}{3}\pi r^3$ . Find, to the nearest tenth, the volume of a sphere whose radius is 6 cm. Include the unit while making the calculation. (6 points)

$$V = \frac{4}{3}\pi(6\text{cm})^3$$

$$\approx 904.8\text{cm}^3$$

The volume of the sphere  
is about  $904.8\text{cm}^3$ .

6. Find the slope of the line connecting the stated pair of points. Show your calculation and make sure that your conclusion is clear. (8 points)

- a. the line connecting  $(-3, 6)$  and  $(2, -4)$

$$x_1 = -3$$

$$y_1 = 6$$

$$x_2 = 2$$

$$y_2 = -4$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-4 - 6}{2 - (-3)}$$

$$= \frac{-10}{5}$$

$$= -2$$

The slope is -2.

- b. the line connecting  $(7, 12)$  and  $(7, -8)$

$$x_1 = 7$$

$$y_1 = 12$$

$$x_2 = 7$$

$$y_2 = -8$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-8 - 12}{7 - 7}$$

$$= \frac{-20}{0} \leftarrow \text{cosmic no no!}$$

The slope is undefined.

7. Find, if they exist, the  $x$ -intercept and the  $y$ -intercept for each of the following lines. Show any relevant work and make sure that your conclusions are clear (as in *write sentences*). (15 points)

- a. The line  $5x - 7y = 35$ .

$$\begin{array}{r} x=0 \\ -7y=35 \\ y=-5 \end{array} \qquad \begin{array}{r} y=0 \\ 5x=35 \\ x=7 \end{array}$$

The  $y$ -intercept is  $(0, -5)$  and the  
 $x$ -intercept is  $(7, 0)$

- b. The line  $y = \frac{x}{3} + 2$ .

$$\begin{array}{r} x=0 \\ y=0+2 \\ y=2 \end{array} \qquad \begin{array}{r} y=0 \\ 0 = \frac{x}{3} + 2 \\ -2 = \frac{x}{3} \\ -6 = x \end{array}$$

The  $y$ -intercept is  $(0, 2)$  and  
the  $x$ -intercept is  $(-6, 0)$ .

- c. The line  $x = 14$ .

The  $x$ -intercept is  $(14, 0)$  and  
there ain't no  $y$ -intercept, silly.

$$y = \frac{8}{3}x - \frac{10}{3}$$

8. Consider the line with equation  $8x - 3y = 10$ . (12 points)

- a. State two points on the line where both coordinates are integers.

Lots of options ...

x	y
5	10
2	2
-1	-6
-4	-14 ...

- b. Use the two points from part (a) to determine the slope of the line. Make sure that your conclusion is clear.

$$\begin{aligned}
 x_1 &= 5 & m &= \frac{y_2 - y_1}{x_2 - x_1} \\
 y_1 &= 10 \\
 x_2 &= 2 & &= \frac{2 - 10}{2 - 5} \\
 y_2 &= 2 & &= \frac{-8}{-3} \\
 & & &= \frac{8}{3}
 \end{aligned}$$

The Slope is  $\frac{8}{3}$ .

- c. Manipulate the equation into slope-intercept form. Show the relevant steps!

$$\begin{aligned}
 8x - 3y &= 10 \\
 8x - 3y - 8x &= 10 - 8x \\
 -3y &= -8x + 10 \\
 \frac{-3y}{-3} &= \frac{-8x + 10}{-3} \\
 y &= \frac{-8x}{-3} + \frac{10}{-3} \\
 y &= \frac{8}{3}x - \frac{10}{3}
 \end{aligned}$$



9. Graph the lines with the equations stated in the captions of figures 1-4. (12 points)

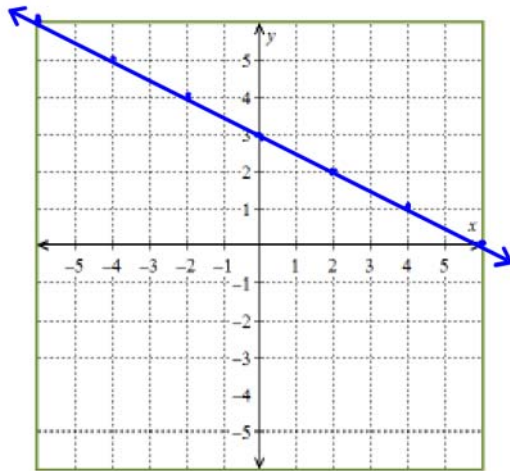


Figure 1:  $y = -\frac{x}{2} + 3$

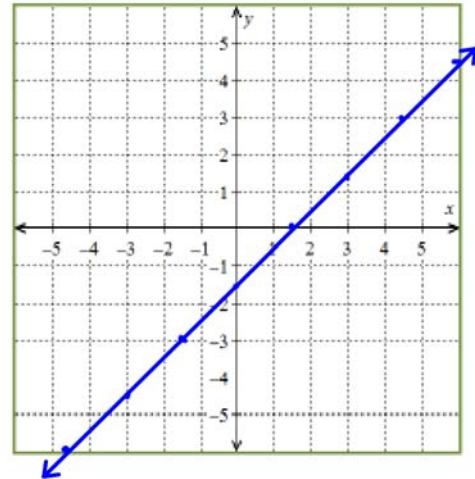


Figure 2:  $2x - 2y = 3$

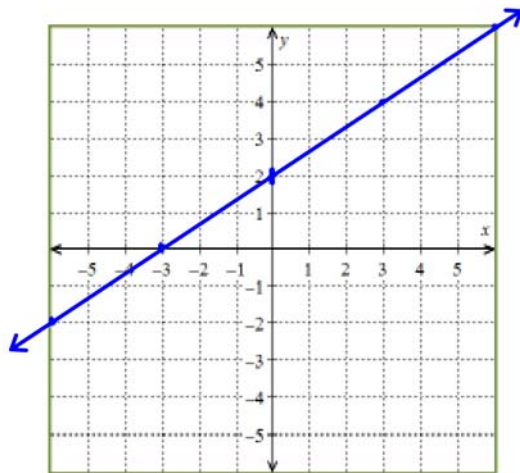


Figure 3:  $x = \frac{3}{2}y - 3$

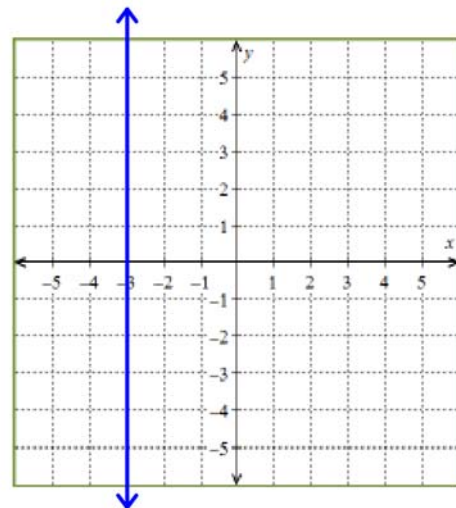


Figure 4:  $2x + 6 = 0$

10. Find the equation of the line that both shares an  $y$ -intercept with and is perpendicular to the line with equation  $3x - 6y = 12$ . Make sure that both your reasoning and conclusion are clear.

(8 points)

Given line

$$3x - 6y = 12$$

$$3x - 6y - 3x = 12 - 3x$$

$$-6y = -3x + 12$$

$$\frac{-6y}{-6} = \frac{-3x + 12}{-6}$$

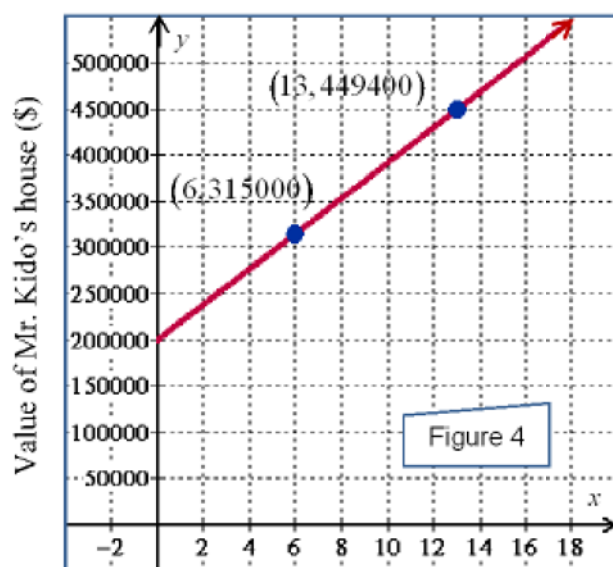
$$y = \frac{-3x}{-6} + \frac{12}{-6}$$

$$y = \frac{1}{2}x - 2$$

The given line has a slope of  $\frac{1}{2}$  and a  $y$ -intercept of  $(0, -2)$ . So the new line has a slope of  $-2$  and a  $y$ -intercept of  $(0, -2)$ .

The equation of the new line is  $y = -2x - 2$ .

11. Mr. Mondo purchased a house in 1985. Six years later the value of the house was \$315,000. Thirteen years after it was first purchased, the house was worth \$449,400. A graph of the value of Mr. Mondo's house is shown in Figure 4. Find and interpret the slope as a rate of change. Make sure that you include the units when finding the slope! (6 points)



$$m = \frac{\text{rise}}{\text{run}} = \frac{\$134400}{7 \text{ years}} = \$19,200/\text{yr}$$

The value of Mr. Mondo's house increased at the constant rate of \$19,200/yr.