

MTH 60, Fall Term 2010

Test 4 – Given December 1, 2010

Name Key

Please read all directions carefully – your test score will be affected if you fail to read and follow directions. Make sure that all of your relevant work is shown on this paper.

1. Use the point-slope form of the equation of a line to determine the equation of the line with a slope of -12 that passes through the point $(-8, 0)$. State your equation in slope-intercept form. (5 points)

$$\begin{aligned}
 x_1 &= -8 \\
 y_1 &= 0 \\
 m &= -12 \\
 y - y_1 &= m(x - x_1) \\
 y - 0 &= -12(x - (-8)) \\
 y &= -12(x + 8) \\
 y &= -12x - 96
 \end{aligned}$$

The equation is $y = -12x - 96$.

2. Find the equation of the line shown in Figure 1. Make sure that the work on this paper clearly shows all of the relevant details related to how you came up with the equation. State your equation in slope-intercept form. (8 points)

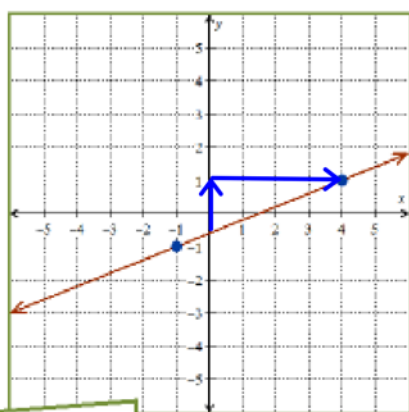


Figure 1

$$\begin{aligned}
 \text{Check } (-1, -1) \\
 -1 &= \frac{2}{5}(-1) - \frac{3}{5} ? \\
 -1 &= -5/5 \checkmark
 \end{aligned}$$

$$m = \frac{\text{rise}}{\text{run}} = \frac{2}{5}$$

$$\text{Point on line: } x = 4, y = 1$$

$$y - y_1 = m(x - x_1)$$

$$y - 1 = \frac{2}{5}(x - 4)$$

$$y - 1 = \frac{2}{5}x - \frac{8}{5}$$

$$y - 1 + 1 = \frac{2}{5}x - \frac{8}{5} + 1$$

$$y = \frac{2}{5}x - \frac{3}{5}$$

The equation of the line is:

$$y = \frac{2}{5}x - \frac{3}{5}$$

3. Use the slope-intercept form of the equation of a line to determine the equation of the line with a slope of 5 that passes through the point $(-2, 6)$. (5 points)

$$\begin{aligned}
 m &= 5, \text{ so the equation is } y = 5x + b \text{ for some } \# b. \\
 x &= -2, y = 6 & 6 &= 5(-2) + b \\
 & & 6 &= -10 + b \\
 6 + 10 &= -10 + b + 10 \\
 16 &= b
 \end{aligned}$$

The equation is $y = 5x + 16$.

4. a. Write the equation $x - 2y = 3$ in slope-intercept form. Call this line A. (4 points)

$$\begin{array}{l|l}
 x - 2y = 3 & y = \frac{-x}{-2} + \frac{3}{-2} \\
 x - 2y - x = 3 - x & y = \frac{1}{2}x - \frac{3}{2} \\
 -2y = -x + 3 & \\
 \frac{-2y}{-2} = \frac{-x + 3}{-2} &
 \end{array}$$

- b. What is the equation of the line perpendicular to line A that passes through the point $(4, -7)$? State your equation in slope-intercept form. Make sure that the work on this paper clearly shows all of the relevant details related to how you came up with the equation. (8 points)

line A has slope $\frac{1}{2}$, so the perpendicular line has slope -2 .

$$\begin{aligned}
 m &= -2 & y - y_1 &= m(x - x_1) \\
 x_1 &= 4 & y - (-7) &= -2(x - 4) \\
 y_1 &= -7 & y + 7 &= -2x + 8 \\
 & & y + 7 - 7 &= -2x + 8 - 7 \\
 & & y &= -2x - 1
 \end{aligned}$$

The equation of the perpendicular line is $y = -2x - 1$.

5. Find and state three points on the line with equation $2x - 3y = -11$ where both coordinates of the points are integers. Graph the line onto Figure 2. Show all relevant work on this paper. (10 points)

x	y
-7	-1
-4	1
-1	3
2	5
5	7

$$\begin{aligned} -3y &= -2x - 11 \\ y &= \frac{-2x - 11}{-3} \end{aligned}$$

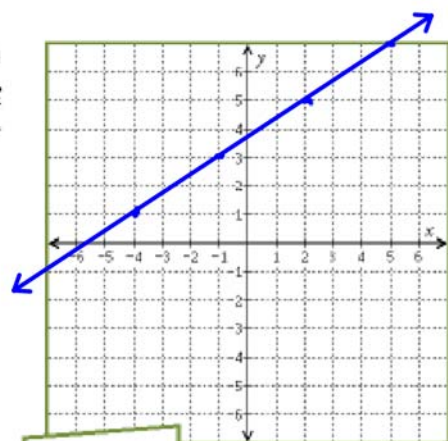


Figure 2

6. Find the value of $g(-2)$ for each of the following functions. To earn full credit your work must be presented in the manner discussed and illustrated during lecture. (1.5 points each)

a. $g(x) = -x^2$

$$\begin{aligned} g(-2) &= -(-2)^2 \\ &= -4 \end{aligned}$$

b. $g(x) = \sqrt{x+6} + 3$

$$\begin{aligned} g(-2) &= \sqrt{-2+6} + 3 \\ &= \sqrt{4} + 3 \\ &= 2 + 3 \\ &= 5 \end{aligned}$$

c. $g(x) = \frac{x}{|x|}$

$$\begin{aligned} g(-2) &= \frac{-2}{|-2|} \\ &= \frac{-2}{2} \\ &= -1 \end{aligned}$$

d. $g(x) = 5$

$$g(-2) = 5$$

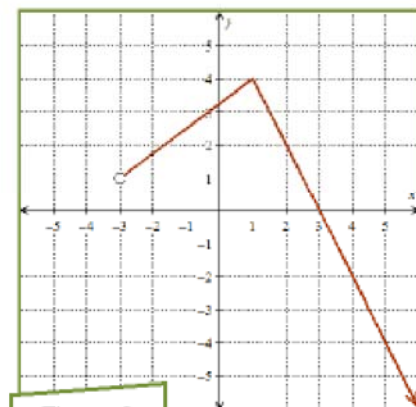
7. Find the value of $h(-4)$ if $h(x) = x^2 - 2x + 3$. To earn full credit your work must be presented in the manner discussed and illustrated during lecture. (4 points)

$$\begin{aligned} h(-4) &= (-4)^2 - 2(-4) + 3 \\ &= 16 + 8 + 3 \\ &= 27 \end{aligned}$$

8. Consider the function f shown in Figure 3. Answer each of the following questions in regards to this function.

- a. State the domain and range of f ;
use interval notation (8 points)

The domain of f is $(-3, \infty)$.
The range of f is $(-\infty, 4]$.



- b. State the values of $f(4)$ and $f(-3)$. (4 points)

$$\begin{aligned} f(4) &= -2 \\ f(-3) &\text{ is not defined.} \end{aligned}$$

- c. For what value(s) of x does $f(x) = -2$? (3 points)

The only value of x which satisfies $f(x) = -2$
is 4.

9. Assume that the monthly maintenance bill for a shopping center is directly proportional to the size of the mall (measured in square-feet). Determine the monthly maintenance bill for a 4,800 ft² shopping center if the monthly maintenance bill for a 180,000 ft² shopping center is \$45,000. (10 points)

Make sure that you show work consistent with that illustrated and discussed in class.

Ratio: $\frac{\text{Bill}}{\text{Size}}$

Let x represent the bill for a 4,800 ft² shopping center.

$$\frac{x}{4800} = \frac{\$45,000}{180,000}$$

$$180,000x = (\$45,000)(4800)$$

$$\frac{180,000x}{180,000} = \frac{(\$45,000)(4800)}{180,000}$$

$$x = \$1200$$

The monthly maintenance bill for a 4800 ft² shopping center is \$1200.

11. Solve the proportion $\frac{7}{x} = \frac{5}{x-y}$ for the variable x . (7 points)

$$\frac{7}{x} = \frac{5}{x-y}$$

$$7(x-y) = 5x$$

$$7x - 7y = 5x$$

$$7x - 7y - 5x = 5x - 5x$$

$$2x - 7y = 0$$

$$2x - 7y + 7y = 0 + 7y$$

$$2x = 7y$$

$$\frac{2x}{2} = \frac{7y}{2}$$

$$x = \frac{7}{2}y$$

12. Fill the completely simplified version of each expression into the provided blank. Show any work in the blank space at the bottom of the page. (1.5 points each)

a. $(x^{15})^3 =$ x^{45}

b. $y \cdot y^{11} =$ y^{12}

c. $(-5x)^2 =$ $25x^2$

d. $(4t^3)^2 =$ $16t^6$

e. $-7z^4 \cdot z^{20} =$ $-7z^{24}$

f. $\left(-\frac{1}{2}a^3\right)\left(-\frac{1}{4}a^2\right) =$ $\frac{1}{8}a^5$

g. $(xy^5)^3 =$ x^3y^{15}

h. $(ab)^2(ab^2) =$ a^3b^4

i. $(6x^2)(3x^2) =$ $18x^4$

j. $6x^2 + x^2 =$ $7x^2$