
MATH 11010: Exam #1 (Spring 2013)

1. Find the equation of the line perpendicular to $3x - 8y = 4$ and which passes through $(-6, 5)$.

2. Find the equation of the line which passes through $(4, -3)$ and $(-5, 2)$.

3. For $f(x) = 6x^2 - 7x + 3$ find

$$\frac{f(x+h) - f(x)}{h}$$

4. For $f(x) = \frac{x+8}{x}$ find

$$\frac{f(x+h) - f(x)}{h}$$

5. Let $f(x) = 2x - 5$ and $g(x) = 3x^2 + 8x - 4$. Find and simplify:

(a) $(f \circ g)(x) =$

(b) $(g \circ f)(x) =$

(c) $(f \circ f)(8) =$

(d) $(g \circ g)(-2) =$

6. Find the domain for each function.

(a) $f(x) = \frac{x^2 - 3x + 2}{2x^2 - 3x - 27}$

(b) $g(x) = \frac{\sqrt{9x+16}}{x^2-1}$

7. Suppose the graph of f is given. Describe how the graph of the following function can be obtained from the graph of f . Be specific!

$$y = f\left(-\frac{1}{3}x\right)$$

8. A function f is given, and the indicated transformations are applied to its graph in the given order. Write the equation for the final transformed graph.

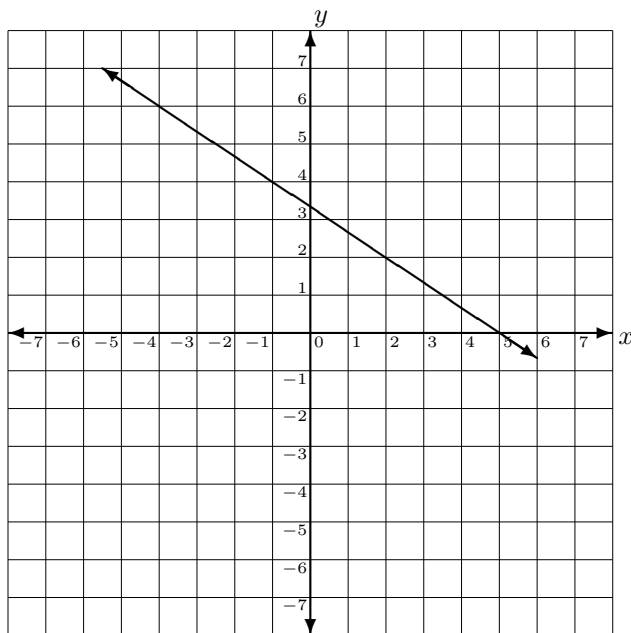
(a) $f(x) = |x|$; stretched vertically by a factor of 2, shifted left 3 units, and shifted up 7 units.

(b) $f(x) = \sqrt{x}$; shrunk horizontally by a factor of $\frac{3}{5}$, reflected about the x -axis, and shifted down 4 units.

9. Let $H(x) = 4\sqrt{9x+2} - 7$. Find nontrivial functions f and g such that

$$(f \circ g)(x) = H(x)$$

10. Given below is a linear function.

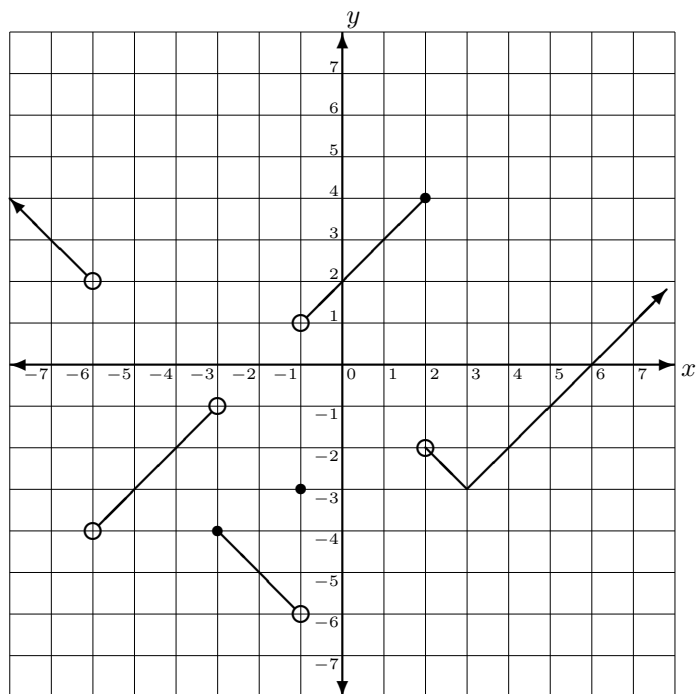


(a) Find the slope of this linear function.

(b) Find the equation of this linear function.

11. Be able to determine the equation of a given graph.

12. Given below is the graph of f . Find



- | | |
|-------------------|---------------------------------------|
| (a) Domain of f | (e) $f(1) =$ |
| (b) Range of f | (f) $f(-6) =$ |
| (c) $f(-3) =$ | (g) intervals where f is increasing |
| (d) $f(-1) =$ | (h) intervals where f is decreasing |

13. Find the following if $f(x) = \begin{cases} 8 - 4x - 2x^2 & \text{if } x \leq -2 \\ 6x + 1 & \text{if } -2 < x \leq 4 \\ 5x - x^2 & \text{if } x > 4 \end{cases}$

- | | |
|--------------|---------------|
| (a) $f(2) =$ | (b) $f(-3) =$ |
|--------------|---------------|

14. Short Answer.

- (a) Determine if $f(x) = 7x^9 + 5x - 1$ is even, odd, or neither.

- (b) Find the **equation** of the line parallel to the y -axis passing through $(4, -5)$.
- (c) Find a linear function f given that $f(3) = 2$ and $f(0) = 7$.
- (d) Give an example of a graph that does **NOT** represent a function and **explain** why it is not a function.
- (e) Given the graph of a function f , how can you determine visually if the function is an even function?
- (f) How can you determine algebraically if lines ℓ_1 and ℓ_2 are parallel?

ANSWERS

1. $y = -\frac{8}{3}x - 11$ 2. $y = -\frac{5}{9}x - \frac{7}{9}$ 3. $12x + 6h - 7$
4. $\frac{-8}{x(x+h)}$
5. (a) $6x^2 + 16x - 13$ (c) 17
(b) $12x^2 - 44x + 31$ (d) 124
6. (a) $x \neq \frac{9}{2}, x \neq -3$ (b) $x \geq -\frac{16}{9}, x \neq \pm 1$
7. reflect about y -axis, horizontal stretch by a factor of 3
8. (a) $y = 2|x + 3| + 7$ (b) $y = -\sqrt{\frac{5}{3}}x - 4$
9. $f(x) = 4\sqrt{x} - 7, g(x) = 9x + 2$ (NOTE: there are many answers)
10. (a) $-\frac{2}{3}$ (b) $y = -\frac{2}{3}x + \frac{10}{3}$
11. See supplemental problems from section 1.7
12. (a) $(-\infty, -6) \cup (-6, \infty)$ (e) 3
(b) $(-6, \infty)$ (f) undefined
(c) -4 (g) $(-6, -3) \cup (-1, 2) \cup (3, \infty)$
(d) -3 (h) $(-\infty, -6) \cup (-3, -1) \cup (2, 3)$
13. (a) 13 (b) 2
14. (a) neither
(b) $x = 4$
(c) $y = -\frac{5}{3}x + 7$
(d) any function that fails the vertical line test would work
(e) An even function is symmetric with respect to the y -axis
(f) The slopes of the lines will be the same.