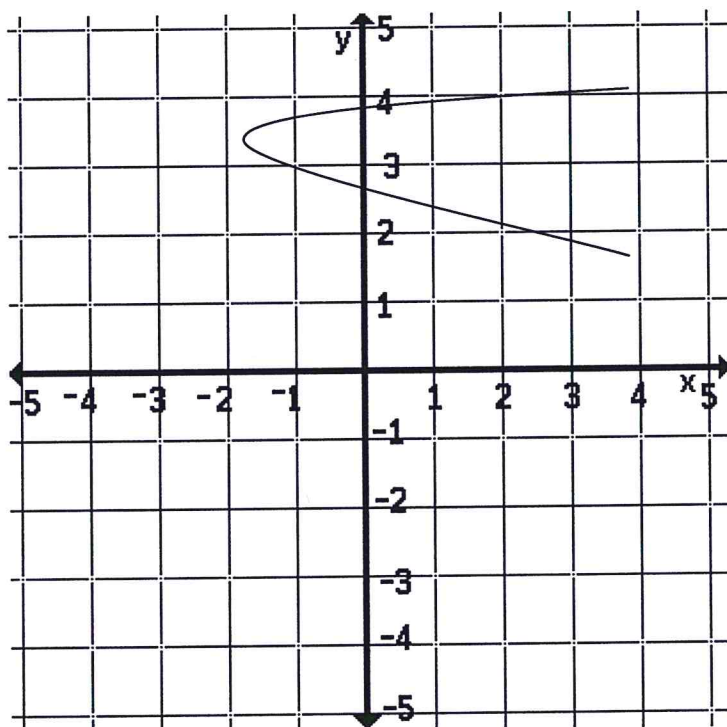
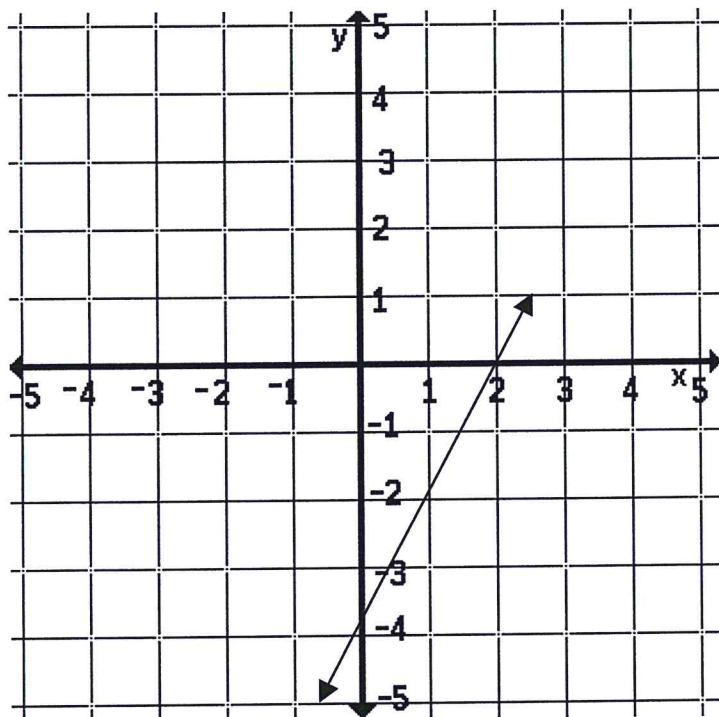


Name \_\_\_\_\_

1. Does each graph represent a function? Explain.



MCR3U

Mrs. Uehling

Ch 1 Review Sheet

2. Is the relation a function? Explain.

Domain  $\{0,1,2,3\}$  Range  $\{9\}$

3. Determine the domain and range of the function.

$$y = -(x - 3)^2 + 2$$

4. Find  $f(3)$  for the function  $f(x) = 2(x - 3)(x + 1)$

5. Determine the vertex of each quadratic function by completing the square. State whether the vertex is a minimum or maximum.

$$f(x) = -3x^2 - 18x + 2$$

MCR3U

Mrs. Uehling

Ch 1 Review Sheet

$$f(x) = \frac{1}{4}x^2 + 3x + 10$$

6. The monthly profit,  $P(x)$ , of a sportswear company, in thousands of dollars, is represented by the quadratic function  $P(x) = -3x^2 + 18x - 2$ , where  $x$  is the amount spent on advertising, in thousands of dollars.
- Determine the company's monthly profit.
  - Determine the amount spent on advertising to achieve the maximum profit.

MCR3U

Mrs. Uehling

Ch 1 Review Sheet

7. Solve  $18x^2 - 3x - 1 = 0$  by factoring.

8. Solve  $2x^2 - 6x + 1 = 0$  using the quadratic formula. Give exact answers (leave with square root in answer)

9. Use the discriminant to determine the number of roots for  $1.8x^2 - 2x - 1 = 0$ .

10. Write the equation for the quadratic function given the x-intercepts  $5 \pm \sqrt{3}$  and contains the point (4,2). Express in standard form.
11. A small rocket is launched. It reaches a maximum height of 120m and lands 10m from the launching pad. Assume the rocket follows a parabolic path. Write the equation that describes its height, h meters, as a function of its horizontal distance, x meters, from the launching pad.
12. Write the equation of a quadratic function with only one x-intercept at -1, and that passes through the point (0,5).

MCR3U

Mrs. Uehling

Ch 1 Review Sheet

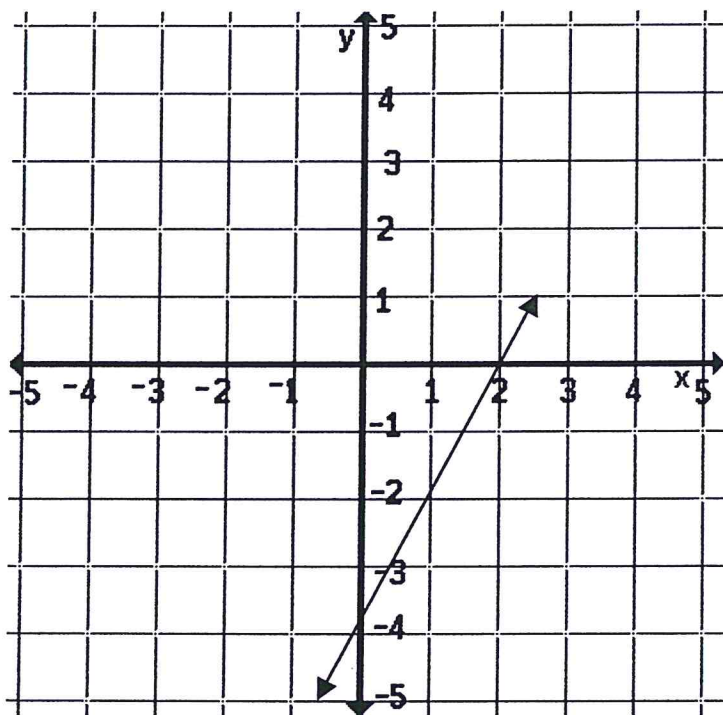
13. Determine the coordinates of the points of intersection of  $y = -2x^2 + x - 2$  and  $y = 4x - 7$ .

14. Determine the number of points of intersection of  $y = x^2 - x + 5$  and  $y = 5x - 4$ .

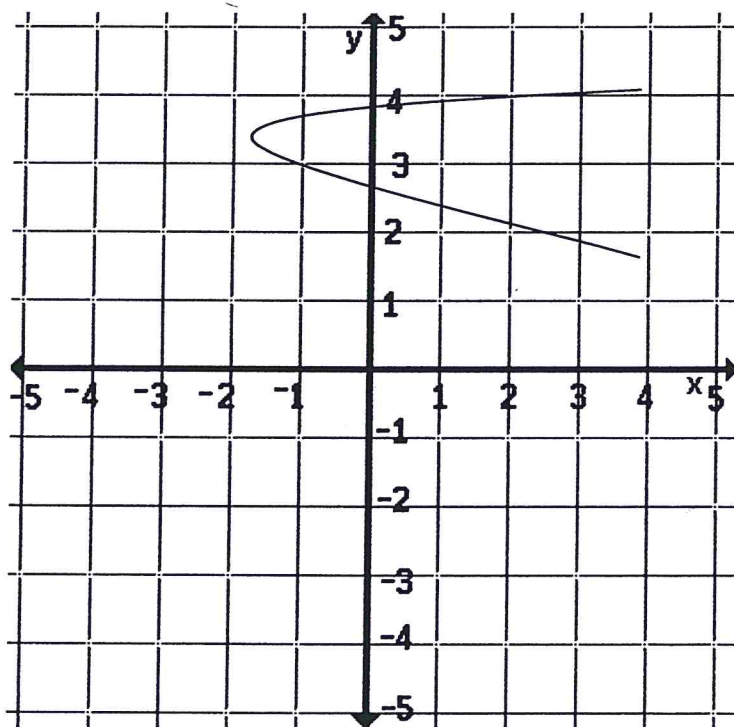
15. Determine the y-intercept of a line that has a slope of 7, and that is tangent (touches at one point) to  $f(x) = 4x^2 - x + 1$ .

Name Answers

1. Does each graph represent a function? Explain.



yes  
vertical line test



NO  
vertical line test

2. Is the relation a function? Explain.

Domain  $\{0,1,2,3\}$  Range  $\{9\}$

yes every domain value has only one range value

3. Determine the domain and range of the function.

$$y = -(x-3)^2 + 2$$

vertex  $(3, 2)$

$$\text{Domain: } \{x \in \mathbb{R}\}$$

$$\text{Range: } \{y \in \mathbb{R}, y \leq 2\}$$

4. Find  $f(3)$  for the function  $f(x) = 2(x-3)(x+1)$

$$f(3) = 2(3-3)(3+1)$$

$$= 2(0)(4)$$

$$= 0$$

5. Determine the vertex of each quadratic function by completing the square. State whether the vertex is a minimum or maximum.

$$f(x) = -3x^2 - 18x + 2$$

$$= -3(x^2 + 6x) + 2$$

$$= -3(x^2 + 6x + (3)^2 - (3)^2) + 2$$

$$= -3(x^2 + 6x + (3)^2) - (-3)(3)^2 + 2$$

$$= -3(x+3)^2 + 27 + 2$$

$$= -3(x+3)^2 + 29$$

$(-3, 29)$  Maximum



$$f(x) = \frac{1}{4}x^2 + 3x + 10$$

$$= \frac{1}{4}(x^2 + 12x) + 10$$

$$= \frac{1}{4}(x^2 + 12x + (6)^2 - (6)^2) + 10$$

$$= \frac{1}{4}(x^2 + 12x + 6^2) - (\frac{1}{4})(6)^2 + 10$$

$$= \frac{1}{4}(x + 6)^2 - 9 + 10$$

$$= \frac{1}{4}(x + 6)^2 + 1 \quad (-6, 1) \quad \text{Minimum}$$

6. The monthly profit,  $P(x)$ , of a sportswear company, in thousands of dollars, is represented by the quadratic function  $P(x) = -3x^2 + 18x - 2$ , where  $x$  is the amount spent on advertising, in thousands of dollars.

- a. Determine the company's monthly profit.

$$= -3x^2 + 18x - 2$$

$$= -3(x^2 - 6x) - 2$$

$$= -3(x^2 - 6x + (-3)^2 - (-3)^2) - 2$$

$$= -3(x^2 - 6x + (-3)^2) - (-3)(-3)^2 - 2$$

$$= -3(x - 3)^2 + 27 - 2$$

$$= -3(x - 3)^2 + 25$$

Vertex (3, 25)

Profit is y value  
in \$1000's.

so  
profit is  
\$25,000

- b. Determine the amount spent on advertising to achieve the maximum profit.

Amount spent is the  $x$  value in \$1000's

so Amount is \$3,000

7. Solve  $18x^2 - 3x - 1 = 0$  by factoring.

$$18x^2 - 3x - 1 = 0$$

$$(18x^2 - 6x) + (3x - 1) = 0$$

$$6x(3x - 1) + 1(3x - 1) = 0$$

$$(6x + 1)(3x - 1) = 0$$

$$6x + 1 = 0$$

$$6x = -1$$

$$x = -1/6$$

$$3x - 1 = 0$$

$$3x = 1$$

$$x = 1/3$$

8. Solve  $2x^2 - 6x + 1 = 0$  using the quadratic formula. Give exact answers (leave with square root in answer)

$$a = 2 \quad b = -6 \quad c = 1$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(1)}}{2(2)}$$

$$= \frac{6 \pm \sqrt{36 - 8}}{4}$$

$$= \frac{6 \pm \sqrt{28}}{4}$$

$$= \frac{6 \pm \sqrt{4 \cdot 7}}{4}$$

$$= \frac{6 \pm 2\sqrt{7}}{4}$$

$$= \frac{3 \pm \sqrt{7}}{2}$$

9. Use the discriminant to determine the number of roots for  $1.8x^2 - 2x - 1 = 0$ .

$$a = 1.8 \quad b = -2 \quad c = -1$$

$$b^2 - 4ac$$

$$= (-2)^2 - 4(1.8)(-1)$$

$$= 4 + 7.2$$

$$= 11.2$$

$$11.2 > 0 \quad \therefore 2 \text{ roots}$$

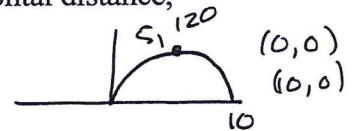
10. Write the equation for the quadratic function given the x-intercepts  $5 \pm \sqrt{3}$  and contains the point  $(4, 2)$ . Express in standard form.

$$\begin{aligned} f(x) &= a(x-r)(x-s) \\ &= a(x-5+\sqrt{3})(x-5-\sqrt{3}) \end{aligned}$$

$$\begin{aligned} f(4) &= 2 \\ 2 &= a(4-5+\sqrt{3})(4-5-\sqrt{3}) \\ 2 &= a(-1+\sqrt{3})(-1-\sqrt{3}) \\ 2 &= a(1+\sqrt{3}-\sqrt{3}-3) \\ 2 &= a(-2) \\ a &= -1 \end{aligned}$$

$$\begin{aligned} f(x) &= -1(x-5+\sqrt{3})(x-5-\sqrt{3}) \\ &= -1(x^2-5-\sqrt{3}x-5+\sqrt{3}x+25-3) \\ &= -1(x^2-10x+22) \\ &= -x^2+10x-22 \end{aligned}$$

11. A small rocket is launched. It reaches a maximum height of 120m and lands 10m from the launching pad. Assume the rocket follows a parabolic path. Write the equation that describes its height,  $h$  meters, as a function of its horizontal distance,  $x$  meters, from the launching pad.



$$\begin{aligned} f(x) &= a(x-r)(x-s) \\ &= a(x-0)(x-10) \\ &= a(x)(x-10) \end{aligned}$$

in vertex form

$$f(x) = -4.8(x-5)^2 + 120$$

$$\begin{aligned} f(5) &= 120 \\ 120 &= a(5)(5-10) \\ 120 &= a(-25) \\ a &= -4.8 \end{aligned}$$

12. Write the equation of a quadratic function with only one x-intercept at  $-1$ , and that passes through the point  $(0, 5)$ .

$$\begin{aligned} f(x) &= a(x-r)(x-s) \\ &= a(x+1)(x+1) \end{aligned}$$

$$\begin{aligned} f(x) &= 5(x+1)(x+1) \\ &= 5(x+1)^2 \end{aligned}$$

$$\begin{aligned} f(0) &= 5 \\ 5 &= a(0+1)(0+1) \\ 5 &= a(1)(1) \\ 5 &= a \end{aligned}$$

13. Determine the coordinates of the points of intersection of  $y = -2x^2 + x - 2$  and  $y = 4x - 7$ .

$$-2x^2 + x - 2 = 4x - 7$$

$$-2x^2 + x - 4x - 2 + 7 = 0$$

$$-2x^2 - 3x + 5 = 0$$

factor  $-2x^2 - 5x + 2x + 5 = 0$

$$(-2x^2 - 5x) + (2x + 5) = 0$$

$$-x(2x + 5) + 1(2x + 5) = 0$$

$$(2x + 5)(-x + 1) = 0$$

14. Determine the number of points of intersection of  $y = x^2 - x + 5$  and  $y = 5x - 4$ .

$$x^2 - x + 5 = 5x - 4$$

$$x^2 - x - 5x + 5 + 4 = 0$$

$$x^2 - 6x + 9 = 0$$

$$a = 1 \quad b = -6 \quad c = 9$$

$$2x + 5 = 0$$

$$2x = -5$$

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

$$-x + 1 = 0$$

$$x = 1$$

$$y = 4(1) - 7 = -3$$

$$y = -2\left(-\frac{5}{2}\right)^2 + \left(-\frac{5}{2}\right) - 2$$

$$= -12.5 - \frac{5}{2} - 2$$

$$= -17$$

$$(1, -3) \quad \left(-\frac{5}{2}, -17\right)$$

$$b^2 - 4ac$$

$$(-6)^2 - 4(1)(9)$$

$$= 36 - 36$$

$$= 0$$

$$\therefore 1 \text{ POI}$$

15. Determine the y-intercept of a line that has a slope of 7, and that is tangent (touches at one point) to  $f(x) = 4x^2 - x + 1$ .

$$y = 7x + k$$

$$4x^2 - x + 1 = 7x + k$$

$$4x^2 - x + 1 - 7x - k = 0$$

$$4x^2 - 8x + 1 - k = 0$$

$$a = 4 \quad b = -8 \quad c = 1 - k$$

$$0 = b^2 - 4ac$$

$$0 = (-8)^2 - 4(4)(1 - k)$$

$$0 = 64 - 16(1 - k)$$

$$= 64 - 16 + 16k$$

$$= 48 + 16k$$

$$-48 = 16k$$

$$-3 = k$$