1. Find the average rate of change of each function from $x_1 = 3$ to $x_2 = 8$

A.
$$f(x) = -\sqrt{x+1}$$
$$\boxed{-\dfrac{1}{5}}$$

B.
$$f(x) = x^2 + 2x - 8$$
$$\boxed{13}$$

2. Find the midpoint and distance between the two given points.

A. $X(3, -5), \; Y(-1, 1)$
$$\boxed{(1, -2)}$$
$$\boxed{D = \sqrt{52} = 2\sqrt{3} = 7.21}$$

B. $Q(2, -3), \; R(5, -8)$
$$\boxed{(3.5, -5.5)}$$
$$\boxed{D = \sqrt{34} = 5.83}$$

3. Find the equation of the line that passes through $(2, -5)$ and is perpendicular to the given line.
$$-x + 4y = -22$$
$$\boxed{y = -4x + 3}$$

Give the equation of any line that is parallel to the given line.
$$\boxed{y = \dfrac{1}{4}x \pm any\ \#}$$

4. Is $(-2, 11)$ a point on the perpendicular line in #3?
$$\boxed{yes}$$

Is $(4, -12)$?
$$\boxed{No}$$

Find 3 points that are on the perpendicular line you found in #3. $\boxed{plug\ in\ any\ x,\ get\ out\ the\ y-value}$

5. Simplify the rational function and find the domain.

A.
$$f(x) = \dfrac{x^2 + 6x - 27}{x^2 - 81}$$
$$\boxed{\dfrac{x-3}{x-9}, \; D: \Re \; x \neq 9, \; -9}$$

B.
$$f(x) = \dfrac{3x^3 - 11x^2 - 4x}{2x^2 - 9x + 4}$$
$$\boxed{\dfrac{x(3x+1)}{2x-1}, \; D: \Re \; x \neq \dfrac{1}{2}, \; 4}$$

C.
$$f(x) = \dfrac{2x}{x-3} + \dfrac{5}{x^2 + x - 12}$$
$$\boxed{\dfrac{2x^2 + 8x + 5}{(x-3)(x+4)}, \; D: \Re \; x \neq 3, \; -4}$$

D.
$$f(x) = \dfrac{x+7}{2x-10} \bullet \dfrac{2x}{x^2 + 2x - 35}$$
$$\boxed{\dfrac{x}{(x-5)^2}, \; D: \Re \; x \neq 5, \; -7}$$

6. Find the domain of each function.

A.
$$f(x) = \dfrac{3x}{2x+5}$$
$$\boxed{D: \Re \; x \neq -\dfrac{5}{2}}$$

B.
$$f(x) = \dfrac{\sqrt{2x+6}}{x-8}$$
$$\boxed{D: \Re \; x \neq 8, \; x \geq -3}$$

C.
$$f(x) = \dfrac{1}{\sqrt{x+3}}$$
$$\boxed{D: \Re \; x \geq -3}$$

7. Find the difference quotient of each function.

A.
$$f(x) = x^2 + 2x, \quad \frac{f(x+h) - f(x)}{h}, \quad h \neq 0$$

$\boxed{2x + h + 2}$

B.
$$f(x) = 4x - 7, \quad \frac{f(3+h) - f(3)}{h}, \quad h \neq 0$$

$\boxed{4}$

8. Determine if each function is even, odd or neither.

A.
$$f(x) = -3x^2 + 2x - 5$$

$\boxed{Neither}$

B.
$$f(x) = 9x^6 + x^2$$

$\boxed{Even}$

C.
$$f(x) = -x(x^2 - 2)$$

$\boxed{Odd}$

D.

$\boxed{Odd}$

E.
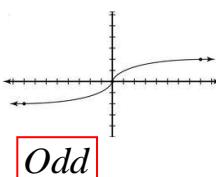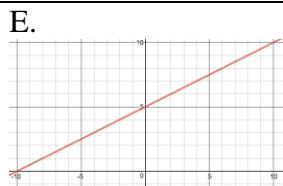
$\boxed{Neither}$

9. Write the equation of the circle in standard form. Identify the center and radius of each circle.

A.
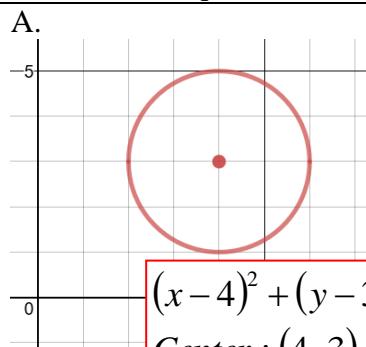
$\boxed{(x-4)^2 + (y-3)^2 = 4}$
$Center : (4, 3)$
$Radius : 2$

B. The endpoints of the diameter are (0, 0), (−6, 6)

$\boxed{(x+3)^2 + (y-3)^2 = 18}$
$\boxed{Center : (-3, 3)}$
$\boxed{Radius : \sqrt{18}}$

C.
$$x^2 + y^2 - 6x + 8y - 1 = 0$$

$\boxed{(x-3)^2 + (y+4)^2 = 26}$
$\boxed{Center : (3, -4)}$
$\boxed{Radius : \sqrt{26}}$

10. Find the domain and range of each graph.

A.

D: $\boxed{[-2, \infty)}$
R: $\boxed{[-1, \infty)}$

B.

D: $\boxed{[-4, \infty)}$
R: $\boxed{[-\infty, \infty)}$

C.

D: $\boxed{[-4, 4)}$
R: $\boxed{[-4, 4]}$

D.
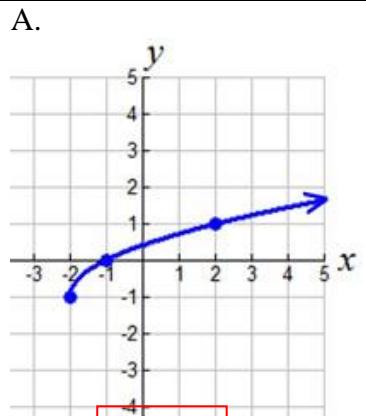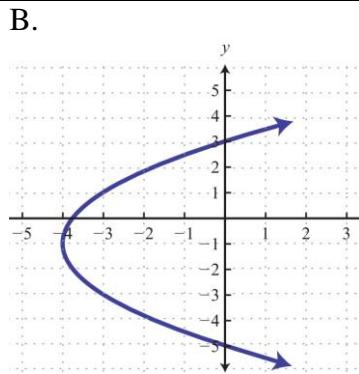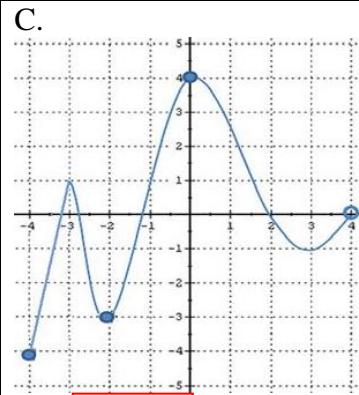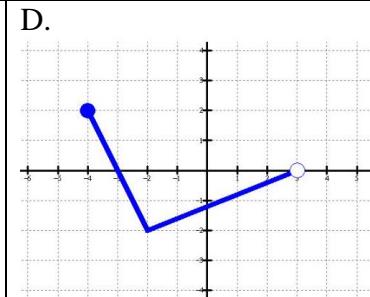
D: $\boxed{[-4, 3)}$
R: $\boxed{[-2, 2]}$

11. Factor each completely

A. $f(x) = 121x^2 - 169$

$\boxed{(11x+13)(11x-13)}$

B. $f(x) = 2x^3 - x^2 - 8x + 4$

$\boxed{(x^2 - 4)(2x - 1)}$

C. $f(x) = 20x^2 - 7x - 3$

$\boxed{(4x+1)(5x-3)}$

D. $f(x) = 4x^2 + 4x + 1$

$\boxed{(2x+1)(2x+1)}$

E. $f(x) = x^2 + 30x - 40$

$\boxed{cannot\ be\ factored}$

12. Find the unknown side.

19 cm

3 cm

x cm
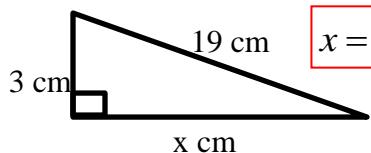
$x = 4\sqrt{22}$ or 18.76 cm

13. A ladder is leaning against a wall. The base of the ladder is 5 ft from the wall. The ladder reaches 28 ft up the wall. How long is the ladder?

$x = 28.44$ ft

13. Evaluate the funtion f(x) for each input.

$$f(x) = -2x^2 + 5x - 1$$

A. $f(-2)$

-19

B. $f(3x)$

$-18x^2 + 15x - 1$

C. $f(x+3)$

$-2x^2 - 7x - 4$

14. The following problems have been incorrectly simplified. Please correctly simplify them.

A. $\dfrac{5x}{4} - \dfrac{x+1}{2} = \dfrac{3x+2}{4}$

$\dfrac{3x-2}{4}$

B. $\dfrac{8x^2 + 16}{4x} = 2x + 4$

$\dfrac{2x^2 + 4}{x}$

C. $(x+5)^2 = x^2 + 25$

$x^2 + 10x + 25$

D. $\dfrac{18x+6}{6x+6} = 3x$

$\dfrac{3x+1}{x+1}$

**15.** Determine the intervals over which the function is increasing, decreasing or constant.

A.
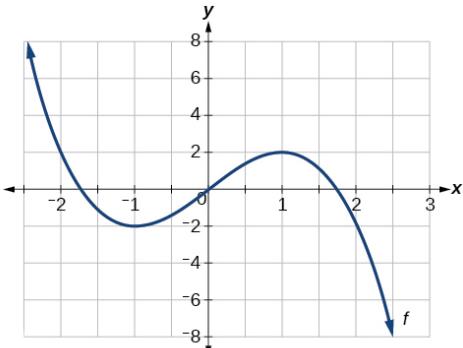
Increasing: $(-1, 0)$
Decreasing: $(-\infty, -1),\ (1, \infty)$
Constant: None

B.

(-3, 1)

(4, -2)
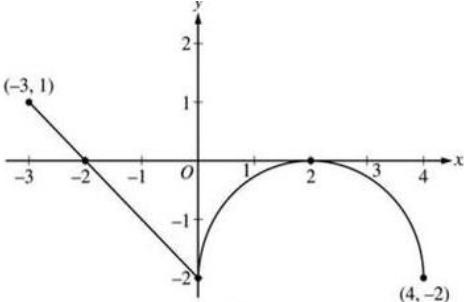
Increasing: $(0, 2)$
Decreasing: $(-3, 0),\ (2, 4)$
Constant: None

C.
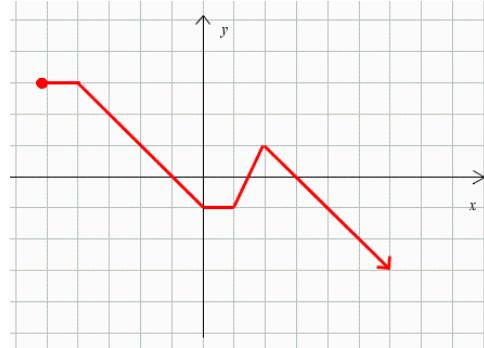
Increasing: $(1, 2)$
Decreasing: $(-4, 0),\ (2, \infty)$
Constant: $(-5-4),\ (0, 1)$

16. Find the x and y intercepts.

A.

$$\dfrac{2}{3}x + 5y = 11$$

$\left(\dfrac{33}{2}, 0\right),\ \left(0, \dfrac{11}{5}\right)$

B.

$$y = 4x^2 - 9$$

$\left(\pm\dfrac{3}{2}, 0\right),\ (0, 9)$

C.

$$y + 21 = 6x^2 - 5x$$

$\left(\dfrac{7}{3}, 0\right),\ \left(-\dfrac{3}{2}, 0\right),\ (0, -21)$

17. Find the zeros.

A.
$$g(x) = 5x^2 + 3x - 7$$
$$x = -1.52,\ 0.92$$

B.
$$h(x) = 3x^3 - 26x^2 - 9x$$
$$x = 0,\ -\frac{1}{3},\ 9$$

C.
$$m(x) = |2x - 7| - 5$$
$$x = 6,\ 1$$

D.
$$f(x) = 8(x - 4)^2 - 16$$
$$x = 4 \pm \sqrt{2}$$

18. Find the values of x so that each statement is true.
$$f(x) = 7x^2 - 16x - 3 \qquad g(x) = 10x + 5$$

A.
$$f(x) = g(x)$$
$$x = -\frac{2}{7},\ 4$$

B.
$$g(x) = 0$$
$$x = -\frac{1}{2}$$

C.
$$f(x) = 12$$
$$x = -\frac{5}{7},\ 3$$

19. Determine whether each is a function.

A. Yes
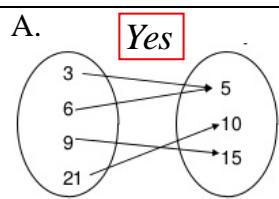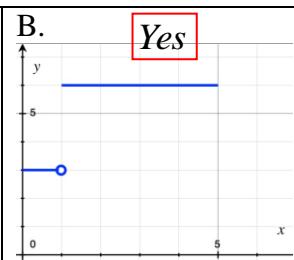
B. Yes

C.

x	3	2	1	0	1	2	3
y	1	-2	2	4	-3	-2	-1

No

D. No

E. Yes
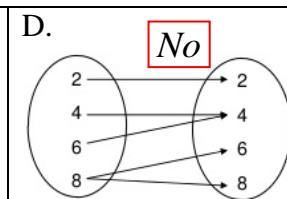
	A	B
1	Name	Marks
2	Tom	81
3	Bob	33
4	Martha	44
5	Brad	73
6	Glen	47
7	Mary	38
8	Stan	56

20. State the parent function and the shifts or reflection. Graph each function. Be sure to include 5 key points.

A.
$$f(x) = (x - 4)^2 - 3$$
x^2
right 4
down 3

B.
$$f(x) = \sqrt{x + 5} + 7$$
$\sqrt{x}$
left 5
up 7

C.
$$f(x) = (x - 3)^3 + 2$$
x^3
right 3
up 2

D.
$$f(x) = -|x|$$
$|x|$
reflected over x − axis

E.
$$f(x) = (-x)^3$$
x^3
reflected over y − axis

21. Write the graph of the equation using the shifts and the parent function.

A.

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

B.

$$f(x) = \sqrt{x - 1} - 4$$

C.

$$f(x) = |x + 4| - 2$$