

Math 2200 Chapter Review

Sections 7.1 - 7.4

Name: Answer Key

Part A - Multiple Choice (Select the most appropriate answer):

1. Order the following numbers, $|-3|$, $|\frac{5}{2}|$, $|4|$, $|-1.5|$, $|0|$, from least to greatest:

a. $|-3|, |-1.5|, |0|, |\frac{5}{2}|, |4|$

b. $|-1.5|, |\frac{5}{2}|, |4|, |-3|, |0|$

c. $|0|, |-1.5|, |\frac{5}{2}|, |-3|, |4|$

d. $|4|, |-3|, |\frac{5}{2}|, |-1.5|, |0|$

2. What is the value of the expression $-|-12 - (-8)|$?

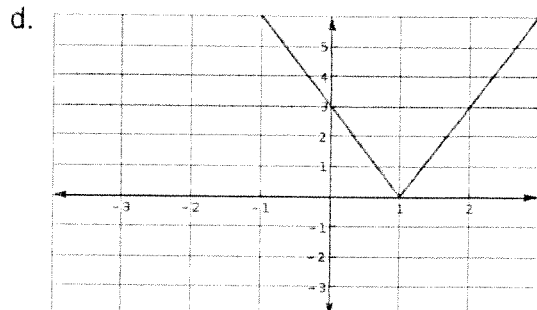
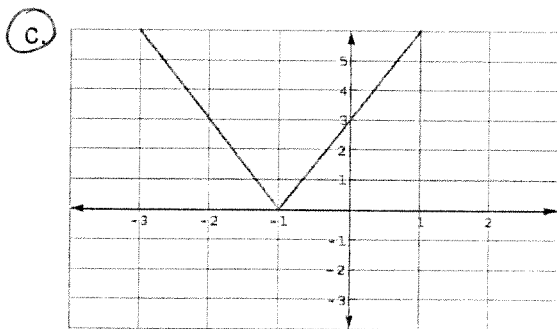
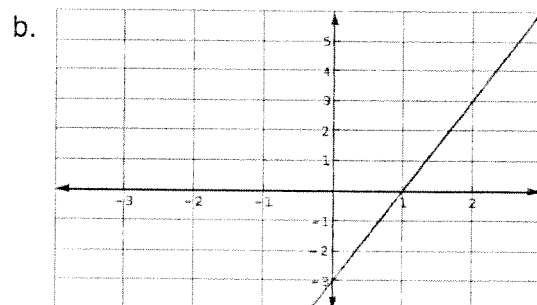
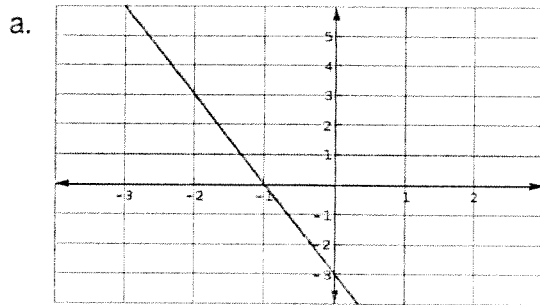
a. -4

b. 4

c. -20

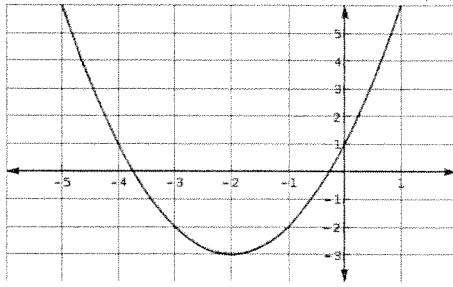
d. 20

3. Consider the function, $f(x) = -3x - 3$. Which graph represents $f(x) = |-3x - 3|$?

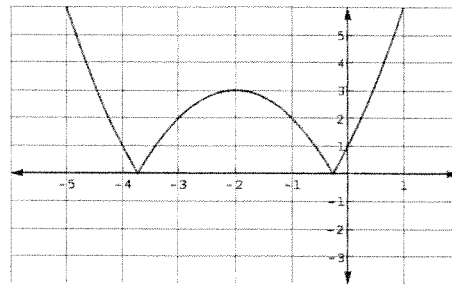


4. Consider the function, $f(x) = (x + 2)^2 - 3$. Which graph represents $f(x) = |(x + 3)^2 - 3|$?

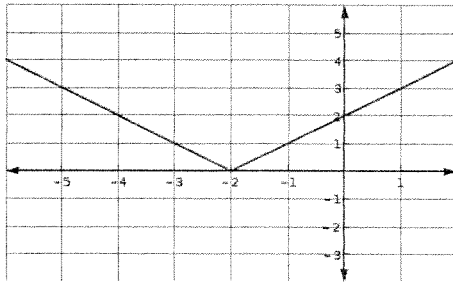
a.



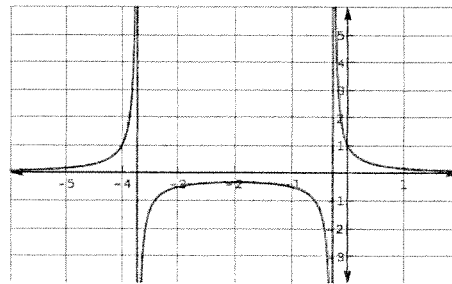
b.



c.



d.



5. What is the value of the expression $|-2(4 - 7)^2 + 4|$?

a. -14

b. 32

c. 14

d. -32

6. What are the equations of the vertical asymptotes for the reciprocal function, $f(x) = \frac{1}{x^2 - 9}$?

a. $x = 3$

b. $x = \pm 3$

c. $x = 9$

d. $x = \pm 9$

7. What are the invariant points of the following functions, $f(x) = x - 5$ and $f(x) = \frac{1}{x-5}$?

a. (4, 1) and (6, -1)

b. (6, 1) and (4, -1)

c. (1, 4) and (-1, 6)

d. (-1, 4) and (1, 6)

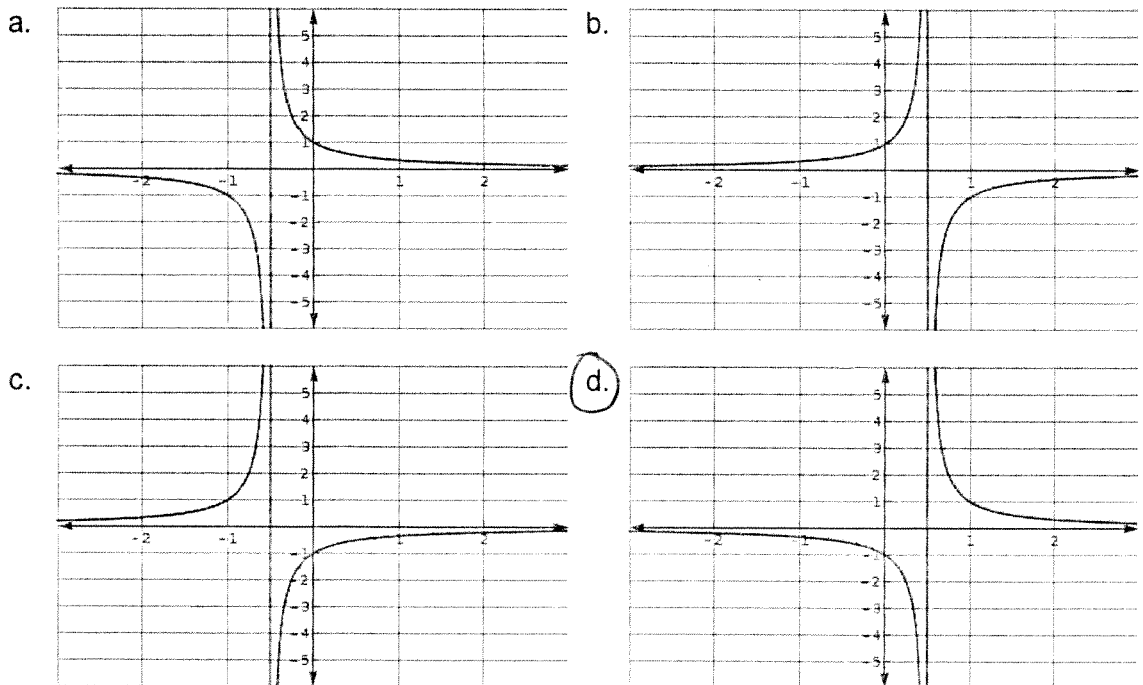
8. What is the equation of the vertical asymptote of $y = \frac{1}{x-6}$?

- a. $x = -6$
- b. $y = -6$
- c. $x = 6$
- d. $y = 6$

9. If $(3, \frac{1}{9})$ is on the graph of $y = f(x)$, then which point will lie on the graph of $y = \frac{1}{f(x)}$?

- a. $(\frac{1}{3}, \frac{1}{9})$
- b. $(\frac{1}{3}, 9)$
- c. $(3, 9)$
- d. $(3, \frac{1}{9})$

10. Which graph represents the reciprocal of the linear function, $y = 2x - 1$?



Part B - Constructed Response (Answer all questions in the space provided):

1. Consider the function, $f(x) = x^2 - x - 6$.

a. What is the reciprocal function of $f(x)$?

$$\frac{1}{x^2 - x - 6} = \frac{1}{(x+2)(x-3)}$$

b. State the vertical asymptote(s) of the reciprocal function.

$$\begin{array}{ll} x+2=0 & x-3=0 \\ x=-2 & x=3 \end{array}$$

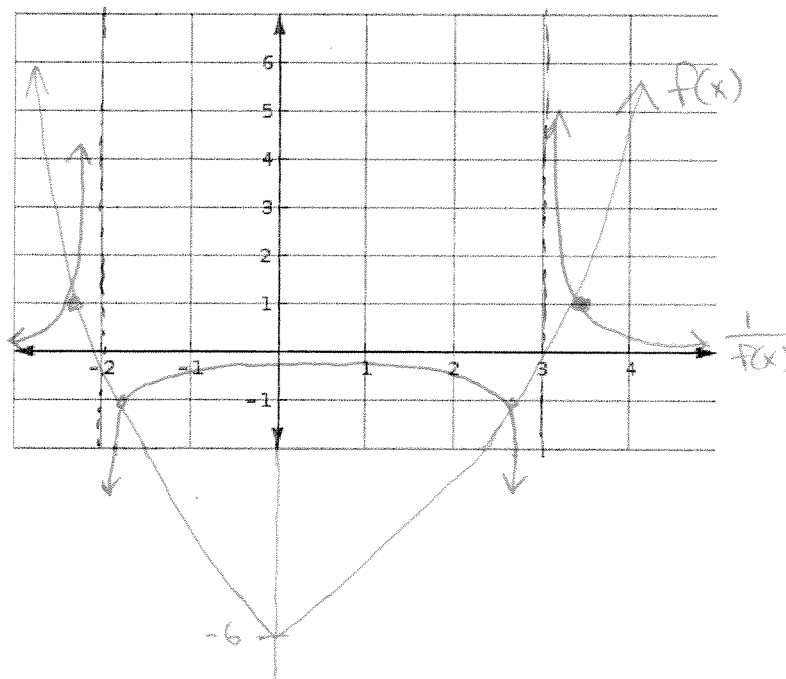
c. Find the invariant points of these functions.

$$\begin{array}{ll} x^2 - x - 6 = 1 & x^2 - x - 6 = -1 \\ x^2 - x - 7 = 0 & x^2 - x - 5 = 0 \\ X = \frac{1 \pm \sqrt{(-1)^2 - 4(1)(-7)}}{2(1)} & X = \frac{1 \pm \sqrt{(-1)^2 - 4(1)(-5)}}{2(1)} = \frac{1 \pm \sqrt{21}}{2(1)} \quad \begin{array}{l} x_1 = 2.79 \\ x_2 = -1.79 \end{array} \\ = \frac{1 \pm \sqrt{29}}{2} & (3.19, 1), (-2.19, 1), (2.79, -1), (-1.79, -1) \\ x_1 = 3.19, x_2 = -2.19 & \end{array}$$

d. What are the x-intercept(s) and y-intercept of the reciprocal function?

$$y = \frac{1}{(0)^2 - (0) - 6} = -\frac{1}{6} \Rightarrow (0, -1/6) \text{ is the } y\text{-intercept.}$$

e. Graph the function $y = f(x)$ and its reciprocal function $y = \frac{1}{f(x)}$



2. Consider the function, $f(x) = 2x - 4$.

a. What is the reciprocal function of $f(x)$?

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

b. State the vertical asymptote(s) of the reciprocal function.

$$2x - 4 = 0$$

$$\frac{2x}{2} = \frac{4}{2}$$

$$\boxed{x = 2}$$

c. Find the invariant points of these functions.

$$2x - 4 = 1$$

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

$$x = \frac{5}{2} = 2.5$$

$$(2.5, 1)$$

$$2x - 4 = -1$$

$$\frac{2x}{2} = \frac{3}{2}$$

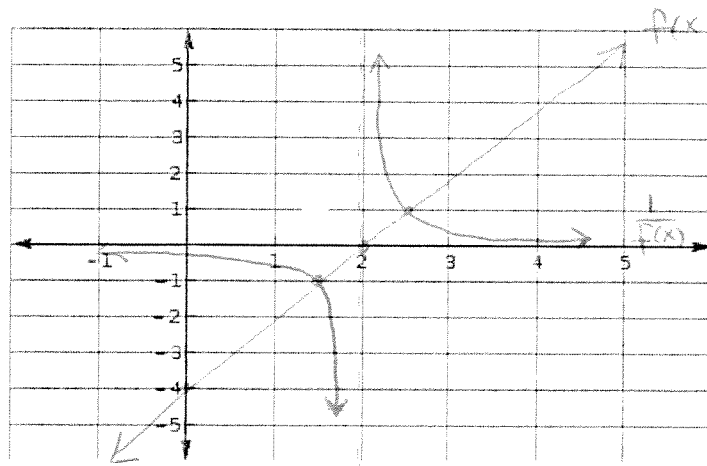
$$x = \frac{3}{2} = 1.5$$

$$(1.5, -1)$$

d. What are the x-intercept(s) and y-intercept of the reciprocal function?

$$y = \frac{1}{2(0)-4} = \frac{-1}{4} \Rightarrow (0, -\frac{1}{4}) \text{ is the y-intercept.}$$

e. Graph the function $y = f(x)$ and its reciprocal function $y = \frac{1}{f(x)}$



3. Solve the following equation: $|2x - 3| - 4 = 3$

CASE 1:

$$(2x - 3) - 4 = 3$$

$$2x - 3 - 4 = 3$$

$$2x = 3 + 3 + 4$$

$$\frac{2x}{2} = \frac{10}{2}$$

$$\boxed{x = 5}$$

CASE 2:

$$-(2x - 3) - 4 = 3$$

$$-2x + 3 - 4 = 3$$

$$-2x = 3 - 3 + 4$$

$$\frac{-2x}{-2} = \frac{4}{-2}$$

$$\boxed{x = -2}$$

4. Solve the following equation: $|x^2 - 4x - 5| = 7$

CASE 1:

$$(x^2 - 4x - 5) = 7$$

$$x^2 - 4x - 5 - 7 = 0$$

$$x^2 - 4x - 12 = 0$$

$$(x + 2)(x - 6) = 0$$

$$\boxed{x = -2} \quad \left\{ \quad \boxed{x = 6} \right.$$

CASE 2:

$$-(x^2 - 4x - 5) = 7$$

$$-x^2 + 4x + 5 - 7 = 0$$

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

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

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

$$= \frac{4 \pm \sqrt{16 - 8}}{2}$$

$$= \frac{4 \pm \sqrt{8}}{2}$$

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

$$= 2 \pm \sqrt{2}$$

$$\boxed{x_1 = 2 + \sqrt{2}} \quad \text{and} \quad \boxed{x_2 = 2 - \sqrt{2}}$$

