

sample

Mathematics 2200

Chapter 7: Absolute Value and Reciprocal Functions - TEST

NAME: Key / 29 = _____

SECTION A: Place the LETTER of your response in the space provided at the right. 10 marks

1. What is the value of the expression $-|(-4) - (-3)^2|$?

1. D

- A) 13
- B) 5
- C) -1
- D) -13

2. Given the table

-3	-5
-2	-3
-1	-1
0	1
1	3

which table represents $y = |f(x)|$?

2. B

- A)

3	5
2	3
1	1
0	1
1	3
- B)

-3	5
-2	3
-1	1
0	1
1	3
- C)

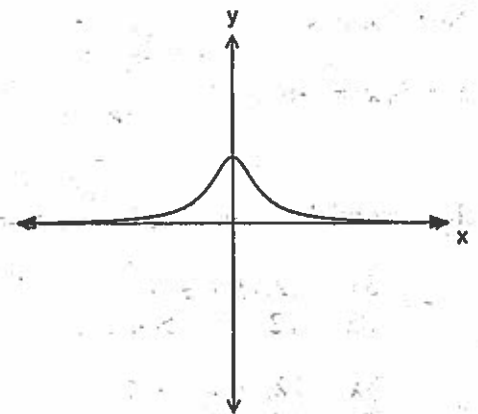
3	-5
2	-3
1	-1
0	1
1	3
- D)

-3	$-\frac{1}{5}$
-2	$-\frac{1}{3}$
-1	-1
0	1
1	$\frac{1}{3}$

3. The graph of $y = \frac{1}{f(x)}$ is shown below. How many x -intercepts does the function $y = f(x)$ have?

3. A

- A) 0
- B) 1
- C) 2
- D) 4



4. What are the equations of the vertical asymptotes for the function $y = \frac{1}{x^2 - 4x}$?

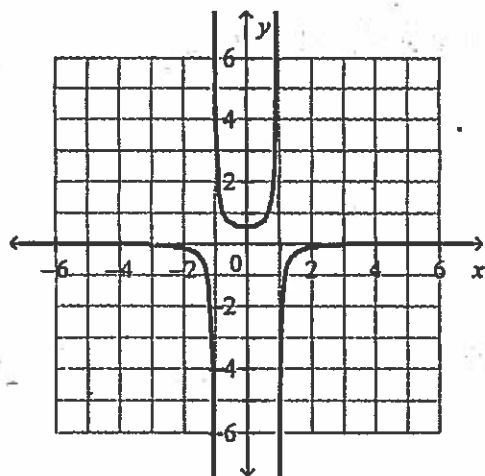
4. B

- A) $x = -2, x = 2$
- B) $x = 0, x = 4$
- C) $x = 0, x = -4$
- D) $x = 2$

A

6. The function $y = \frac{1}{f(x)}$ is shown. What is the function $y = f(x)$?

6. A



A) $y = -2x^2 + 2$

B) $y = -2x^2 - 2$

C) $y = 2x^2 + 2$

D) $y = 2x^2 - 2$

7. The function $y = f(x)$ contains the point $(-2, -\frac{1}{3})$. Which is a point on the graph of $y = \frac{1}{f(x)}$?

7. C

A) $(2, -\frac{1}{3})$

B) $(-2, \frac{1}{3})$

C) $(-2, -3)$

D) $(2, 3)$

8. Solve: $2|4 - x| - 5 = 3$

8. B

A) No solutions

B) $x = 0, x = 8$

C) $x = 0, x = -8$

D) $x = 3, x = 5$

9. Which piece-wise function represents $y = |3x - 12|$?

9. B

A) $y = \begin{cases} 3x - 12, & \text{if } x \leq 4 \\ -3x + 12, & \text{if } x > 4 \end{cases}$

B) $y = \begin{cases} 3x - 12, & \text{if } x \geq 4 \\ -3x + 12, & \text{if } x < 4 \end{cases}$

C) $y = \begin{cases} 3x - 12, & \text{if } x \leq -4 \\ -3x + 12, & \text{if } x > -4 \end{cases}$

D) $y = \begin{cases} 3x - 12, & \text{if } x \geq -4 \\ -3x + 12, & \text{if } x < -4 \end{cases}$

10. The reciprocal of which function would have two vertical asymptotes?

10. D

A) $y = x^2 + 9$

B) $y = 3x + 9$

C) $y = x^2 + 2x + 1$

D) $y = x^2 - 8x + 9$

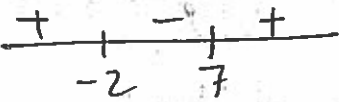
SECTION B: Answer ALL questions in the space provided. Algebraic methods are required. Ensure that you include appropriate workings. 19 marks

1. Solve. Check for extraneous solutions.

or (11) for each verification

$$|x^2 - 5x - 14| = x + 2$$

$$\left. \begin{aligned} x^2 - 5x - 14 &= 0 \\ (x-7)(x+2) &= 0 \\ x=7 \quad x=-2 \end{aligned} \right\} \textcircled{1}$$



CASE 1: $x \leq -2, x \geq 7$ (11)

$$x^2 - 5x - 14 = x + 2$$

$$\left(\begin{aligned} x^2 - 6x - 16 &= 0 \\ (x-8)(x+2) &= 0 \end{aligned} \right. \textcircled{1}$$

$$\left. \begin{aligned} x=8 \quad x=-2 \\ 8 \geq 7 \quad -2 \leq -2 \end{aligned} \right\} \textcircled{1}$$

$x=8, x=-2$ are solutions (11)

CASE 2: $-2 < x < 7$

$$-(x^2 - 5x - 14) = x + 2$$

$$-x^2 + 5x + 14 = x + 2$$

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

$$(x-6)(x+2) = 0 \textcircled{1}$$

$$x=6 \quad x=-2 \textcircled{11}$$

$-2 < 6 < 7 \therefore$ is a solution

$x = -2, 6, 8$

2. For the function $y = |x^2 - 4x - 5|$,

- Determine the x-intercepts and the y-intercept.
- Determine the vertex of the parabola and its image.
- Sketch its graph.
- State the domain and range.

x-int:

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

$$(x-5)(x+1) = 0 \textcircled{1}$$

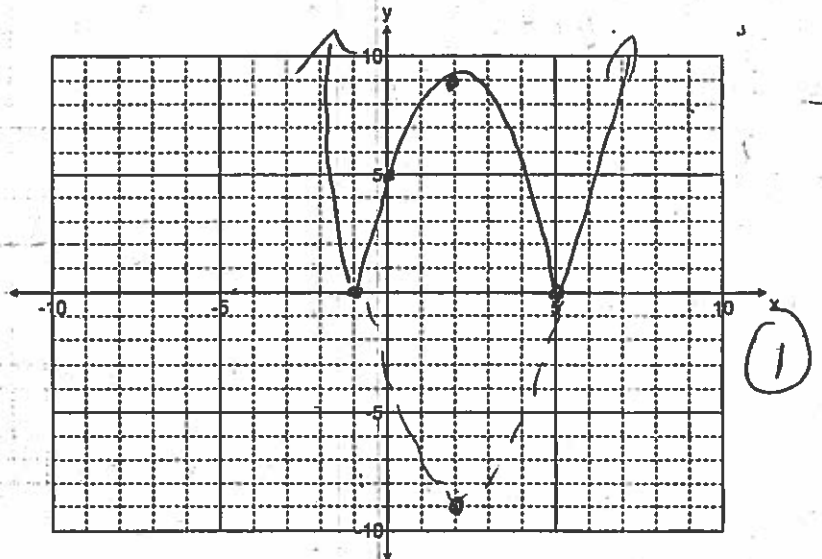
$$x=5 \quad x=-1$$

y-int: $y = |0^2 - 4(0) - 5|$

$$y = |-5| \textcircled{11}$$

$$y = 5$$

$$x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = 2 \textcircled{11}$$



(1)

(11)

3. Sketch the graphs of $y = -2x + 3$ and its reciprocal on the axes below. State (and show) the asymptotes (vertical and horizontal), intercepts, and invariant points. ___ 4

$$y = \frac{1}{-2x+3}$$

$$x\text{-int: } 0 = -2x + 3$$

$$2x = 3$$

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

$$VA: x = \frac{3}{2} = 1.5 \quad HA: y = 0$$

invariant points:

$$-2x + 3 = 1$$

$$-2x + 3 = -1$$

$$-2x = -2$$

$$-2x = -4$$

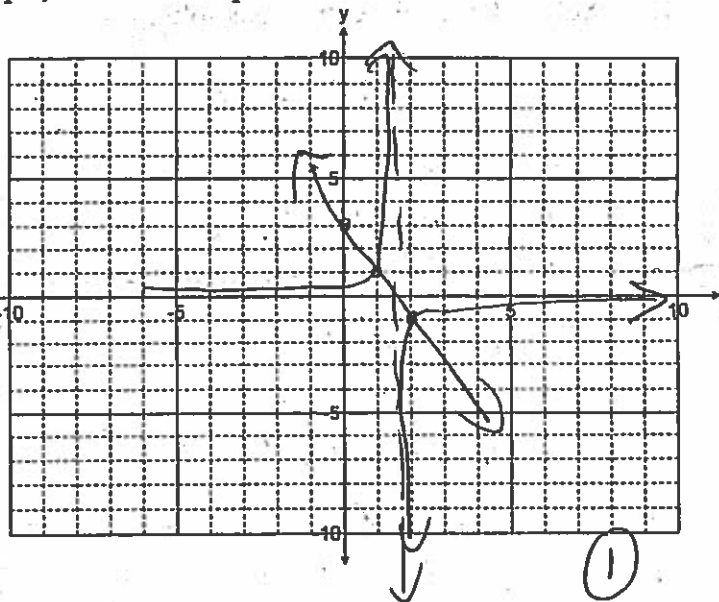
$$x = 1$$

$$x = 2$$

y-int:

$$y = \frac{1}{-2(0)+3}$$

$$= \frac{1}{3}$$



4. Sketch the graphs of $y = x^2 - 6x + 8$ and its reciprocal on the axes below. State (and show) the asymptotes (vertical and horizontal), intercepts, and invariant points, and the vertex and its image. ___ / 5

x-int:

$$0 = x^2 - 6x + 8$$

$$0 = (x-4)(x-2)$$

$$x = 4 \quad x = 2$$

$$VA: x = 2, x = 4$$

$$y\text{-int: } y = 8$$

$$y = \frac{1}{8}$$

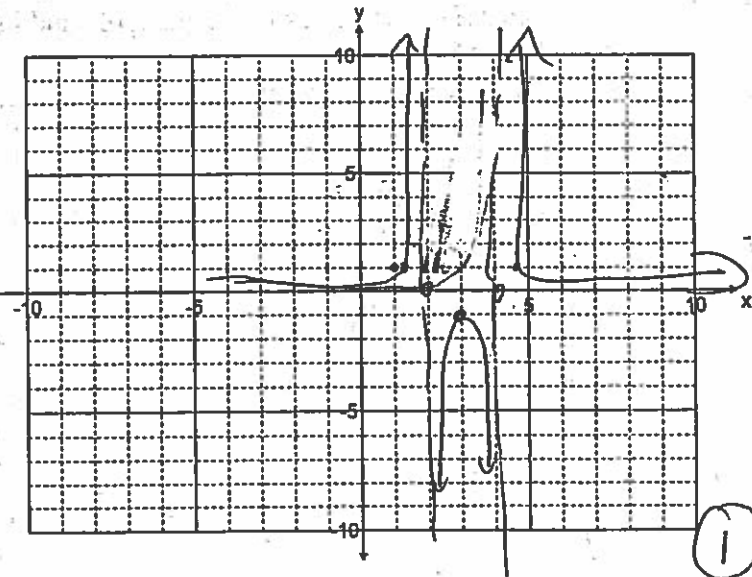
invariant points:

$$x^2 - 6x + 8 = 1$$

$$x^2 - 6x + 7 = 0$$

$$x = \frac{6 \pm \sqrt{8}}{2}$$

$$x = 4.4 \quad x = 1.6$$



$$x^2 - 6x + 8 = -1$$

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

$$(x-3)(x-3) = 0$$

$$x = 3$$

$$x = \frac{-b}{2a} = \frac{-(-6)}{2(1)} = 3$$

$$y = 3^2 - 6(3) + 8 = 9 - 18 + 8 = -1 \quad (3, -1)$$

$$= -1$$