

MATH 1314

Test 3 Review

18 Multiple Choice Questions

1. Find the domain:

a. $f(x) = \frac{x}{7x-14}$

$7x-14 \neq 0$
 $7x \neq 14$
 $\frac{7x}{7} \neq \frac{14}{7}$
 $x \neq 2$
 $(-\infty, 2) \cup (2, \infty)$

b. $f(x) = \sqrt{5x-1}$

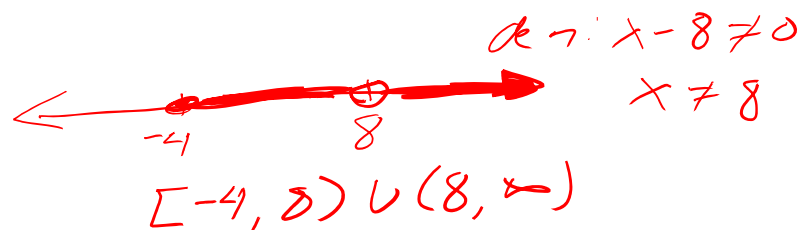
$5x-1 \geq 0$
 $5x \geq 1$
 $x \geq 1/5$
 $[1/5, \infty)$

c. $f(x) = \sqrt{5-4x}$

$5-4x \geq 0$
 $-4x \geq -5$
 $\frac{-4x}{-4} \geq \frac{-5}{-4}$
 $x \leq 5/4$
 $(-\infty, 5/4]$

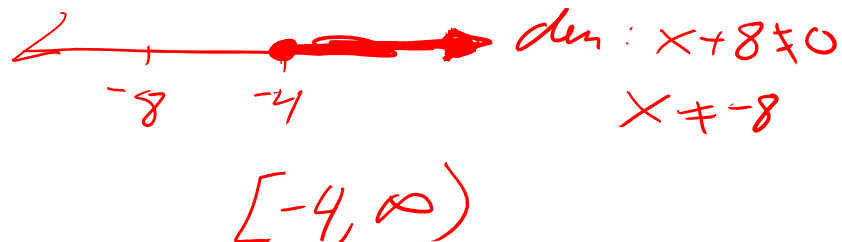
d. $f(x) = \frac{\sqrt{x+4}}{x-8}$

sq root:
 $x+4 \geq 0$
 $x \geq -4$



e. $f(x) = \frac{\sqrt{x+4}}{x+8}$

sq root:
 $x+4 \geq 0$
 $x \geq -4$



2.

a. Calculate $f(-2)$ if $f(x) = x^2 + x$

$$\begin{aligned} \uparrow \\ x \quad f(-2) &= (-2)^2 + (-2) \\ &= 4 - 2 = 2 \quad (-2, 2) \\ &\quad \quad \quad \uparrow \\ &\quad \quad \quad y \end{aligned}$$

b. Calculate $f(-2)$ if $f(x) = \begin{cases} x^2 + 2x & x \leq -1 \\ x & x > -1 \end{cases} \longrightarrow f(0) = 0$

$$[-2 \leq -1]$$

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

$$\begin{aligned} \uparrow \\ x \quad &= 4 - 4 = 0 \end{aligned}$$

$$(-2, 0) \quad \uparrow \\ \quad \quad \quad y$$

$$[0 > -1]$$

c. Which point below is on the graph of $f(x)$.

$$f(x) = \begin{cases} 2 & x < -1 \\ 4 & x = -1 \\ x^2 - 1 & x > -1 \end{cases}$$

~~$(-2, 0)$~~ or $(1, 0)$
↑ ↑ ↑ ↑
x y x y

$(-2, 0)$:

$$f(-2) = 2 \rightarrow (-2, 2)$$

$$[-2 < -1]$$

$(1, 0)$

$$f(1) = 1^2 - 1 = 1 - 1 = 0 \rightarrow (1, 0)$$

$$[1 > -1]$$

3. Determine which of the following is on the graph.

a. $f(x) = -\frac{1}{2}x - 3$

~~(-1, 1)~~

(0, -3)

$$(-1, 1) : f(-1) = -\frac{1}{2}(-1) - 3 = \frac{1}{2} - \frac{3}{1} = \frac{1}{2} - \frac{6}{2} = -\frac{5}{2}$$

(-1, -5/2)

$$(0, -3) : f(0) = -\frac{1}{2}(0) - 3 = 0 - 3 = -3 \rightarrow (0, -3)$$

b. $f(x) = 2x^2 - 3x - 1$

(1, -2)

~~(-1, -1)~~

$$(1, -2) : f(1) = 2(1)^2 - 3(1) - 1$$

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

$$= 2 - 3 - 1 = -2$$

(1, -2)

$$(-1, -1) : f(-1) = 2(-1)^2 - 3(-1) - 1$$

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

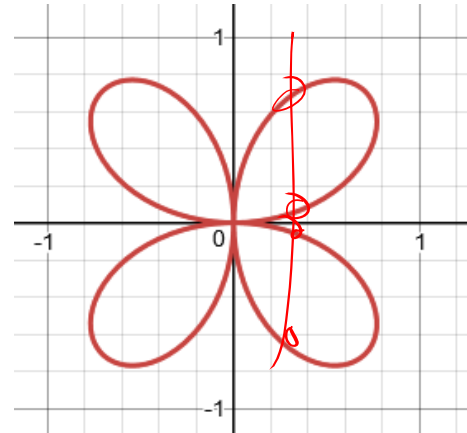
$$= 2 + 3 - 1 = 4$$

(-1, 4)

4. Determine if the following is a function:

a. $x^2 + y^2 = 25$ Any even exponents of $y \rightarrow$ Not a function.
 Not a function.

d.

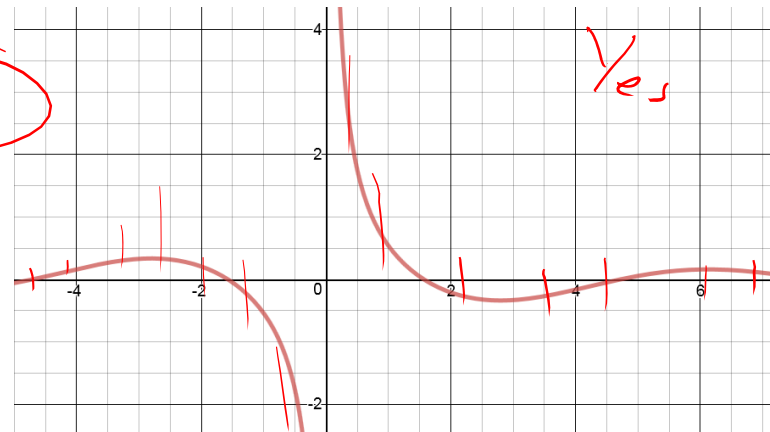


Not a Function

b. $y = x^3 + 2x^2 + 5x - 1$
 Yes

e.

c. $|y| = x$ Solve for y
 $y = +x$ $y = -x$
 $y = \pm x$ one x -value has 2 answers
 Not a Function



Yes

5.

a. Sketch the graph $f(x) = -\sqrt{x-1}$

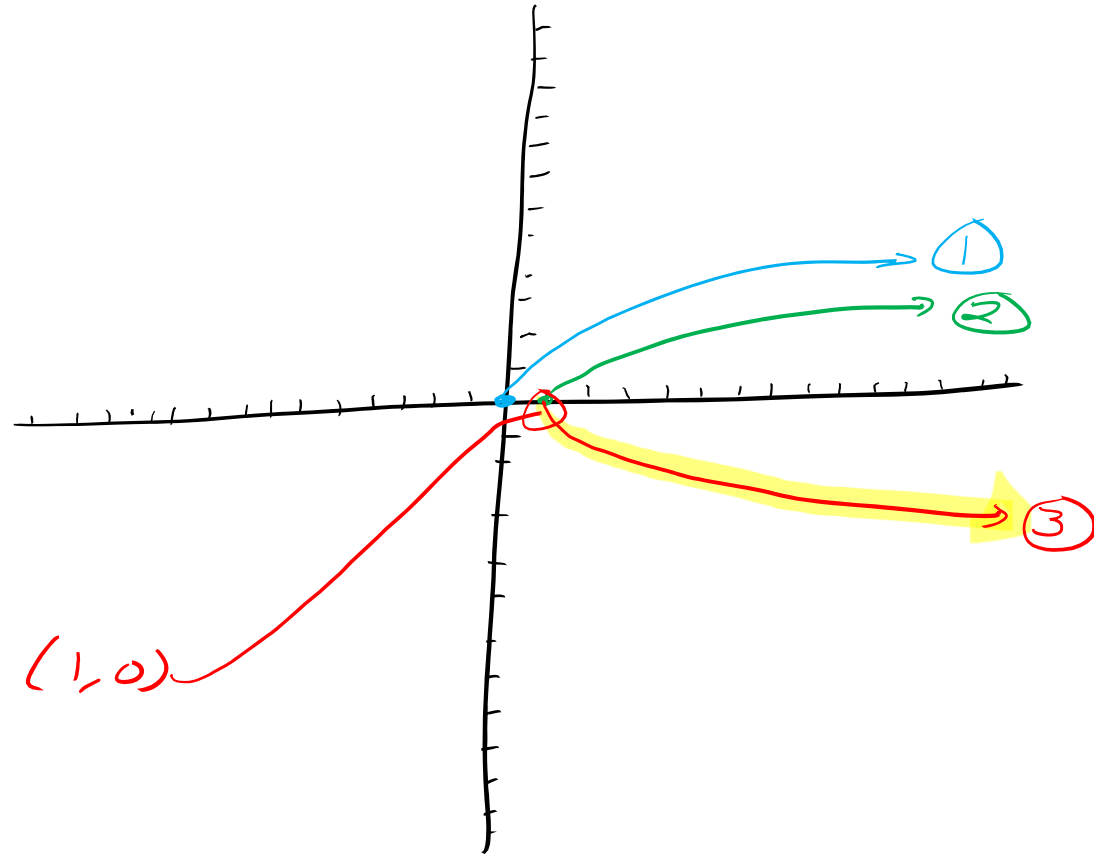
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① Parent Function
 $y = \sqrt{x}$ or Radical Function

② Right 1
 $y = \sqrt{x-1}$

③ x-axis reflection
 $f(x) = -\sqrt{x-1}$

Key Point: $(0,0) \rightarrow (1,0) \rightarrow (1,0)$



b. Sketch the graph $f(x) = -(x+2)^2 - 1$

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① Parent Function

$y = x^2$ or Quadratic Function

② Left 2

$y = (x+2)^2$

③ x-axis reflection

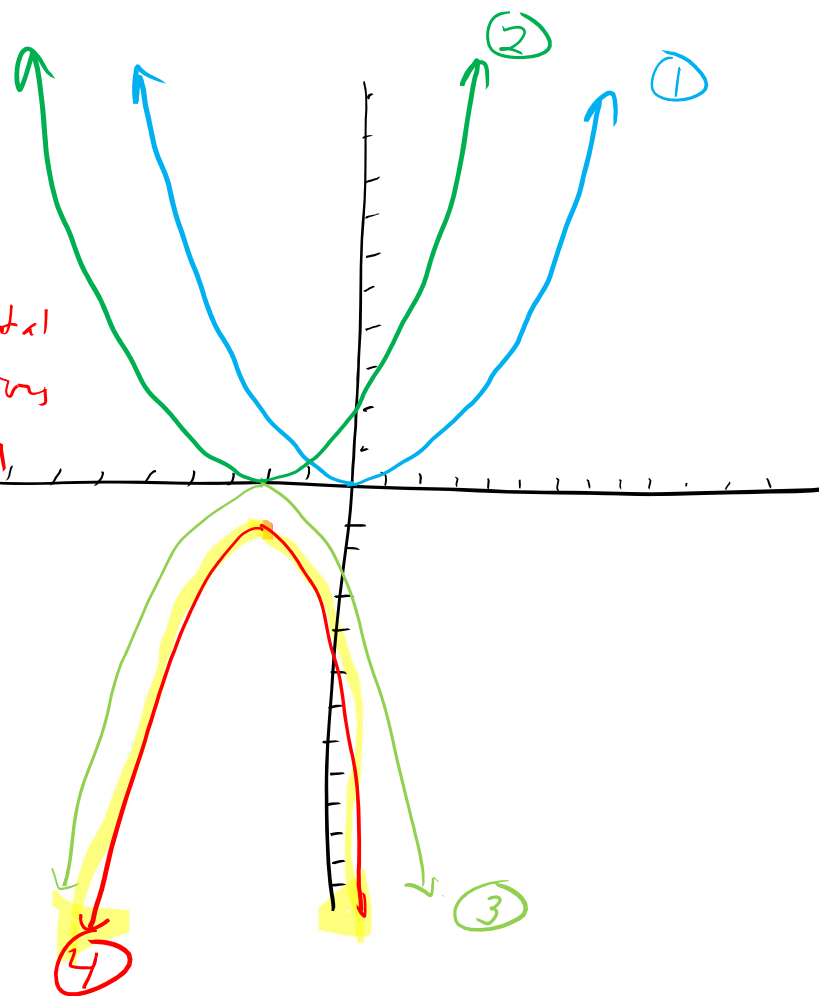
$y = -(x+2)^2$

④ Down 1

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

Key Point: $(0,0) \rightarrow (-2,0) \rightarrow (-2,0) \rightarrow (-2,-1)$

Height \rightarrow Horizontal
Rates \rightarrow Reflections
Vary \rightarrow vertical



Popper 18

Fill out Choice D for Questions 1 – 5

6.

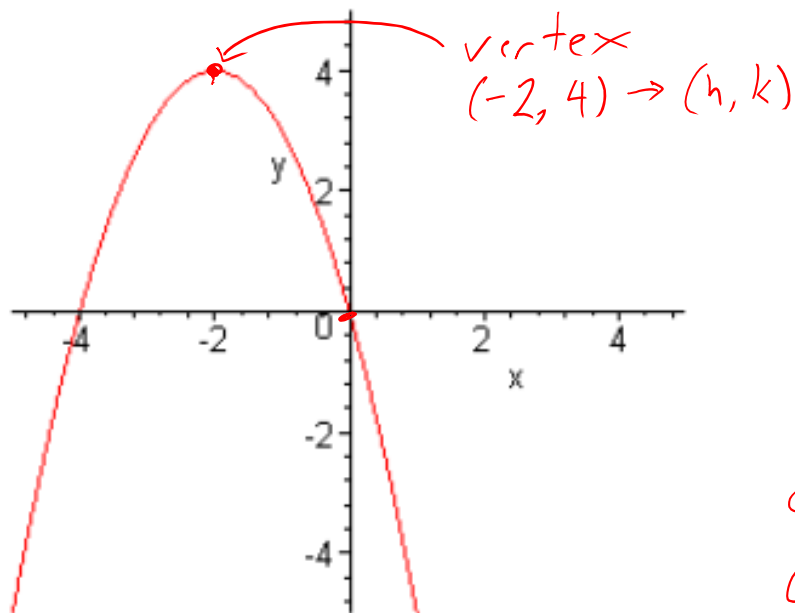
a. What are the necessary transformations $f(x) = (x + 3)^3 - 2$

Cubic function $y = x^3$

Left +3 $y = (x + 3)^3$

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

b. What is the function?



$$f(x) = a(x-h)^2 + k$$

$$f(x) = a(x+2)^2 + 4 \quad \neq$$

Pick any other (x, y) point on the graph.

Plug in (0, 0)

$$0 = a(0+2)^2 + 4$$

$$0 = a(2)^2 + 4$$

$$0 = 4a + 4$$

$$-4 = 4a$$

$$-1 = a$$

If needed:

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

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

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

$$f(x) = -x^2 - 4x$$

7.

a. Find the vertex $f(x) = 2x^2 - 4x + 21$

$a=2$ $b=-4$ $c=21$

$$x = \frac{-b}{2a} = \frac{-(-4)}{2(2)} = \frac{4}{4} = 1 \rightarrow h$$

$$f(1) = 2(1)^2 - 4(1) + 21 = 2(1) - 4(1) + 21 = 2 - 4 + 21 = 19 \rightarrow k$$

vertex: $(h, k) \rightarrow (1, 19)$

If standard form: $f(x) = a(x-h)^2 + k \rightarrow f(x) = 2(x-1)^2 + 19$

b. Find the maximum or minimum value of the function

$$f(x) = x^2 - 16x + 8$$

$a=1$
 $b=-16$
 $c=8$

a is positive \curvearrowright
open up
vertex is a minimum

$$x = \frac{-b}{2a} = \frac{16}{2(1)} = \frac{16}{2} = 8$$

$$f(8) = 8^2 - 16(8) + 8 = 64 - 128 + 8 = -64 + 8 = -56$$

$$\begin{array}{r} (10+6)(8) \\ 80+48 \\ 128 \end{array}$$

Minimum Value: -56

what is
min/max?
y-value
where is
the min/max?
x-value

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