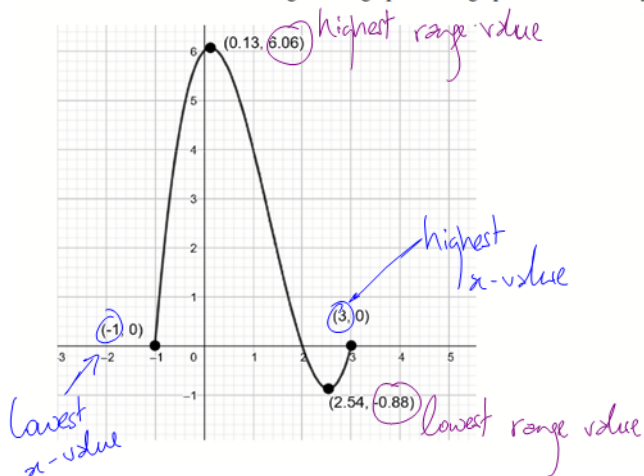


11U: Functions - U2 - More Practice

1. State the definition of a function. (this IS on the test tomorrow)

Make sure you know this!

2. What are the domain and range of the graph? Is the graph a function? Why or why not?



lowest domain value highest domain value

$$D_f = \{x \in \mathbb{R} \mid -1 \leq x \leq 3\}$$

$$R_f = \{f(x) \in \mathbb{R} \mid -0.88 \leq f(x) \leq 6.06\}$$

Yes, this is a function because it passes the V.L.T. (vertical line test)

3. Consider the function $f(x) = -2x^2 + 5$. Determine

- a) $f(2)$.
- b) $f(2k)$
- c) x , if $f(x) = -3$

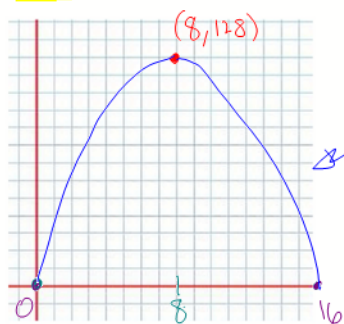
$$\begin{aligned} \Rightarrow f(2) &= -2(2)^2 + 5 \\ &= -8 + 5 \\ &= -3 \end{aligned}$$

$$\begin{aligned} \Rightarrow f(2k) &= -2(2k)^2 + 5 \\ &= -8k^2 + 5 \end{aligned}$$

$$\begin{aligned} \Rightarrow -3 &= -2x^2 + 5 \\ \Rightarrow -8 &= -2x^2 \\ \Rightarrow x^2 &= 4 \\ \Rightarrow x &= \pm 2 \end{aligned}$$

NOT ON THE TEST

4. Ms. Jackson has 32 m of fencing to make a rectangular pen for her rabbits. The wall of her house will serve as one side of the pen, so she will use fencing for only three sides of the rectangle. Express the area of the rabbit pen as a function of its width and then determine the domain and range of the area function (hint: make a sketch). (nothing this tough on the test, but it's a good q!)



$$\begin{aligned} A &= l \times w \\ &= (32 - 2w)w \\ \Rightarrow A(w) &= 32w - 2w^2 \end{aligned}$$

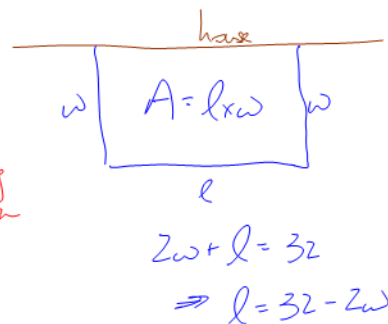
quadratic fn (opening down)

zeros:

$$\begin{aligned} w &= 0 \\ 32 - 2w &= 0 \\ \Rightarrow w &= 16 \end{aligned}$$

∴ max is $A(8) = 32(8) - 2(8)^2 = 128_m$

Picture



$$\begin{aligned} D_A &= \{w \in \mathbb{R} \mid 0 \leq w \leq 16\} \\ R_A &= \{A(w) \in \mathbb{R} \mid 0 \leq A(w) \leq 128\} \end{aligned}$$

5. Given the function $g(x) = |x|$, write the equation for a transformed function, $f(x)$, after the following transformations: (No sketch required - just the equation)

horizontal stretch by the factor $\frac{1}{2} \Rightarrow k = 2$

vertical stretch by the factor 3 $\Rightarrow a = 3$

Reflection around the y-axis (a horizontal flip) $\leftarrow k$ is negative (ie $k = -2$)

Shift 4 units right and 2 units down

$d = 4$

$c = -2$

$$\therefore f(x) = 3 \mid -2(x - 4) \mid - 2$$

6. Consider the function $f(x) = 3x^2 - \sqrt{x}$. Determine the range of $f(x)$ if the domain is given by $D_f = \{0, 1, 4, 9\}$.

$$f(0) = 3(0)^2 - \sqrt{0} = 0 \quad \parallel \quad f(1) = 3(1)^2 - \sqrt{1} = 2 \quad \parallel \quad f(4) = 3(4)^2 - \sqrt{4} = 46 \quad \parallel \quad f(9) = 3(9)^2 - \sqrt{9} = 240$$

$$\therefore R_f = \{0, 2, 46, 240\}$$

7. Determine the inverse of the function $g(x) = -3(2x+6)^2 - 1$. Use whichever technique you prefer (brute force or transformations).

Brute Force (switch $g(x)$ and x - solve for $g^{-1}(x)$)

$$x = -3(2(g^{-1}(x)+3))^2 - 1$$

$$\Rightarrow x+1 = -3(2(g^{-1}(x)+3))^2$$

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

$$\Rightarrow \pm \sqrt{\frac{x+1}{-3}} = 2(g^{-1}(x)+3)$$

$$\Rightarrow g^{-1}(x)+3 = \pm \frac{1}{2} \sqrt{\frac{x+1}{-3}}$$

$$\Rightarrow g^{-1}(x) = \pm \frac{1}{2} \sqrt{\frac{x+1}{-3}} - 3$$

Transformations

horizontal become vertical
vertical become horizontal
inverse for type
inverse operations
 g^{-1} is "sqrt"

$$g(x) = -3(2(x+3))^2 - 1$$

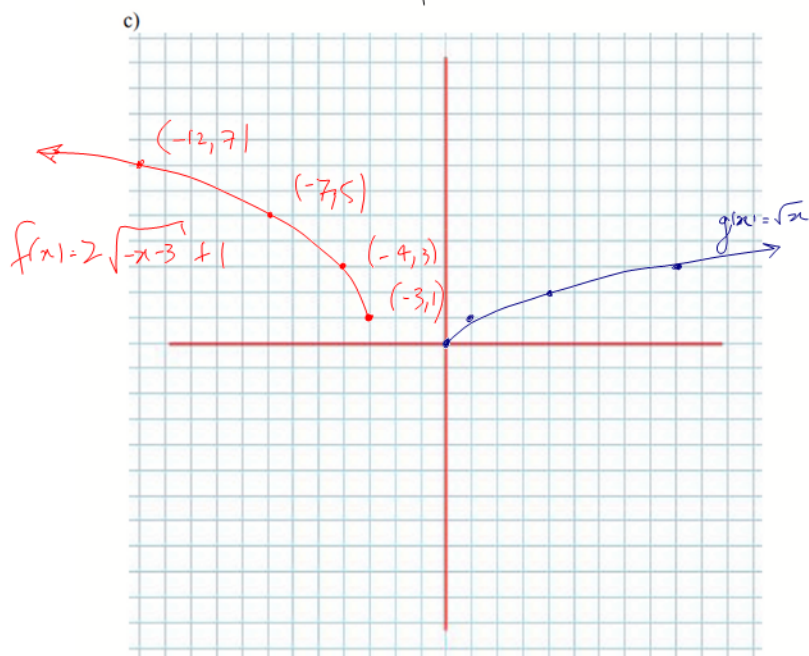
$$g^{-1}(x) = \pm \frac{1}{2} \sqrt{-\frac{1}{3}(x+1)} - 3$$

8. Given the function $f(x) = 2\sqrt{-x-3} + 1$:

- State the parent function, and call it $g(x)$
- State all transformations applied to the parent function
- Sketch the graph of the parent function and $f(x)$ on the same set of axes.

a) $g(x) = \sqrt{x}$

	HORIZONTAL	VERTICAL
Flip	Yes	No
Stretch	$\times (-1)$	$\times 2$
Shift	3 left (-3)	1 up (+1)



ToV

Parent

x_p	$g(x) = \sqrt{x}$
0	0
1	1
4	2
9	3

Transformed

$x_T = -x_p - 3$	$f = 2g + 1$
-3	1
-4	3
-7	5
-12	7

Not asked for, but

$$D_f = \{x \in \mathbb{R} \mid x \leq -3\}$$

$$R_f = \{f(x) \in \mathbb{R} \mid f(x) \geq 1\}$$