

11U - U2: Intro to Functions - Practice Problems

Multiple Choice

1 A 2 D 3 A 4 C 5 D 6 A 7 A
8 A 9 B 10 A 11 D 12 B 13 B

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



Domain: $\{x \in \mathbb{R} \mid x \geq 5\}$

Range: $\{y \in \mathbb{R} \mid y \geq 0\}$

Yes this is a f because it passes the V.L.T.

vertical line test.
↓

15. Consider the function $f(x) = 3x - 8$. Determine

- a) $f(3k)$.
- b) x , if $f(x) = 4$

a) $f(3k) = 3(3k) - 8$
 $= 9k - 8$

b) $4 = 3x - 8$
 $\Rightarrow 3x = 12$
 $\Rightarrow x = 4$

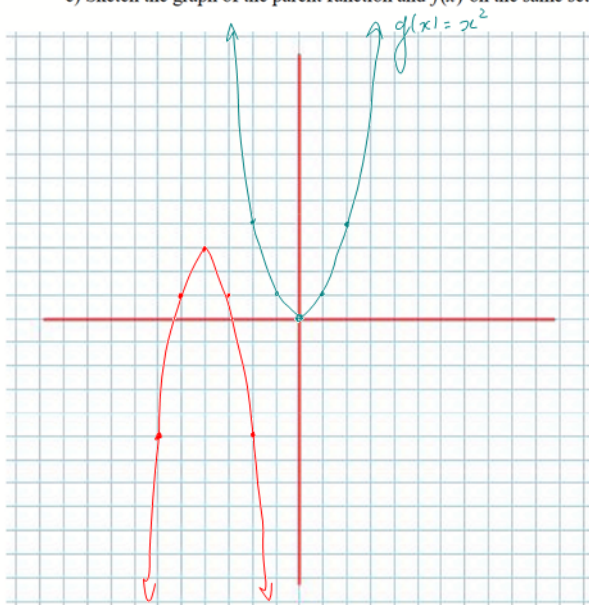
16. Given the function $f(x) = -2(x+4)^2 + 3$:

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

Parent f : $g(x) = x^2$

Transformations

	Horizontal	Vertical
Flip	no	Yes $x(-1)$
Stretch	$\times 1$	Yes $\times 2$
Shift	4 left (-4)	3 up (+3)



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

T.o.V.

Parent

x_p	$g = x^2$
-2	4
-1	1
0	0
1	1
2	4

Transformed

$x_T = x_p - 4$	$f = -2g + 3$
-6	-5
-5	1
-4	3
-3	1
-2	-5

17. Given the function $f(x) = \sqrt{x}$, write the **equation** for a transformed function, $g(x)$, after the following transformations: (No sketch required - just the equation)

horizontal stretch by the factor 2, $\rightarrow k = \frac{1}{2}$
 vertical stretch by the factor 3 $\rightarrow a = 3$
 Reflection around the x-axis \rightarrow vertical flip ($\Rightarrow a = -3$)
 Shift 3 units left and 5 units up
 $d = -3$ $c = 5$

$$g(x) = a f(k(x-d)) + c$$

$$g(x) = -3 \sqrt{\frac{1}{2}(x+3)} + 5$$

18. Consider the function $f(x) = 6 + 5x - 2x^2$. Determine the range of $f(x)$ if the domain is given by $D_f = \{-2, -1, 0, 3\}$.

$$f(-2) = 6 + 5(-2) - 2(-2)^2 = -12 \quad \parallel \quad f(-1) = 6 + 5(-1) - 2(-1)^2 = -1 \quad \parallel \quad f(0) = 6 - 5(0) - 2(0)^2 = 6 \quad \parallel \quad f(3) = 6 + 5(3) - 2(3)^2 = 3$$

$$\therefore \text{Range} \cup R_f = \{-12, -1, 6, 3\}$$

19. Determine the inverse functions $f^{-1}(x)$ and $g^{-1}(x)$ given $f(x) = \frac{1}{2}\sqrt{3x-6} + 5$ and $g(x) = -3(x+2)^2 - 1$. Use the method of your choice (brute force or transformations).

$f(x) \Rightarrow$ Brute force $g(x) \Rightarrow$ transformations

$f(x)$

$$x = \frac{1}{2} \sqrt{3(f^{-1}(x)) - 6} + 5$$

$$\Rightarrow x - 5 = \frac{1}{2} \sqrt{3f^{-1}(x) - 6}$$

$$\Rightarrow 2(x-5) \stackrel{\text{square}}{=} \sqrt{3f^{-1}(x) - 6} \stackrel{\text{square}}{}$$

$$\Rightarrow (2(x-5))^2 = 3f^{-1}(x) - 6$$

$$\Rightarrow (2(x-5))^2 + 6 = 3f^{-1}(x)$$

$$\Rightarrow f^{-1}(x) = \frac{1}{3} (2(x-5))^2 + 2$$

$g(x)$

Horizontal

Shift 2 left

(-2)

(become vertical)

! \rightarrow

Inverse fr type: $\pm \sqrt{\quad}$

Vertical

Stretch $\times -3$

Shift 1 down (-1)

(become horizontal) ($x \rightarrow \frac{1}{3}$, shift +1)

vertical flip too!

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

don't forget " \pm "!