Lesson 4 HW

December 14, 2018 2:50 PM

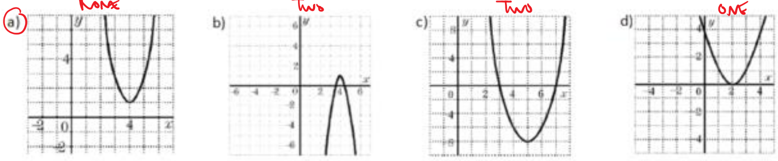
Name:_______________ Date:_________________

Pre Calculus 11: Ch3/4 HW Lesson 4 Domain, Range, and Using your Ti-83

ROOTS MEAN X-INTERCEPTS

1. Indicate the number of roots for each of the following quadratic functions:

a) NONE b) TWO c) TWO d) ONE



2. Define the *"domain of a function"* using your own words:

VALID X-VALUES IN A GRAPH.

All X-VALUES ALLOWED IN A FUNCTION

3. What is the difference between domain and range?

DOMAIN DEFINES WHAT INPUT VALUES ARE ALLOWED (X-VALUES)
RANGE DEFINES WHAT OUTPUT VALUES ARE ALLOWED (Y-VALUES)

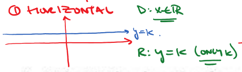
4. How do you know that the domain or range of a function will be "all real numbers" $[x \in \mathbb{R}]$? Explain:

- IF ALL INPUT/OUTPUT VALUES ARE ALLOWED, YOUR DOMAIN/RANGE WILL HAVE NO RESTRICTIONS. THEN IT WILL BE ALL REAL NUMBERS.
- IF THE GRAPH GOES FROM NEGATIVE INFINITY TO POSITIVE INFINITY CONTINUOUSLY WITH NO DISCONTINUATION, THE DOMAIN (LEFT TO RIGHT) OR RANGE (TOP TO BOTTOM) WILL BE ALL REAL NUMBERS.

5. What is the domain and range of a linear function?

THIS DEPENDS ON IF THE LINE IS 'HORIZONTAL', 'VERTICAL', OR 'SLANTED'.

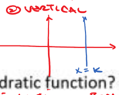
① HORIZONTAL D: $x \in \mathbb{R}$



$y=k$

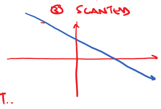
R: $y=k$ (ONLY k)

② VERTICAL D: $x=k$ R: $y \in \mathbb{R}$



$x=k$

③ SLANTED D: $x \in \mathbb{R}$ R: $y \in \mathbb{R}$



$y=mx+b$

6. What is the domain of a quadratic function?

A QUADRATIC FUNCTION (PARABOLA) IS CONTINUOUS FROM LEFT TO RIGHT.

ie:

- THIS GRAPH WILL EXTEND LEFT TO NEGATIVE INFINITY & EXTEND RIGHT TO POSITIVE INFINITY

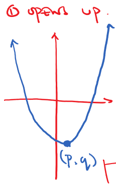
∴ DOMAIN: $x \in \mathbb{R}$. [x CAN BE ALL REAL NUMBERS]

7. How do you find the range of a quadratic function? Explain:

THE RANGE OF A PARABOLA DEPENDS ON WHICH WAY THE PARABOLA OPENS, 'UP' OR 'DOWN'

- USE THE Y-COORDINATE OF THE VERTEX TO DETERMINE THE RANGE.

① OPENS UP.

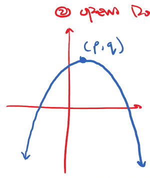


(p, q)

GRAPH OPENS UP. THE VERTEX IS THE LOWEST POINT. ALL OTHER Y-VALUES IS BIGGER THAN q.

$\boxed{R: y \geq q}$

② OPENS DOWN



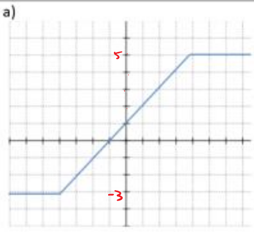
(p, q)

- GRAPH OPENS DOWN.
- ALL OTHER POINTS ON THE PARABOLA HAVE A Y-VALUE LESS THAN q.

RANGE: $\boxed{y \leq q}$

8. Given each of the following graphs, indicate the domain and range:

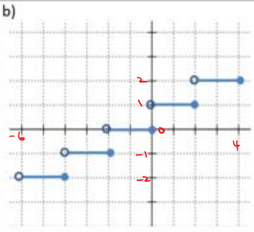
a)



Domain: $x \in \mathbb{R}$.

Range: $-3 \le y \le 5$.

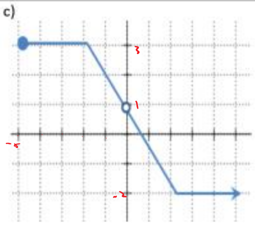
b)



Domain: $-6 < x \le 4$.

Range: $y \in \{-2, -1, 0, 1, 2\}$

c)



Domain: $-5 \le x \; ; \; x \ne 0$. OR

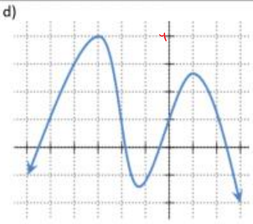
$-5 \le x < 0$ or $0 < x$

Range: $-2 \le y < 3 \; ; \; y \ne 1$. OR

$-2 \le y < 1$ or $1 < y \le 3$.

Two ways to write the Domain & Range.

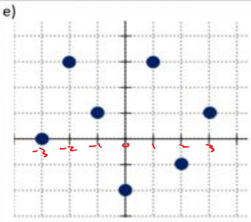
d)



Domain: $x \in \mathbb{R}$.

Range: $y \le 4$.

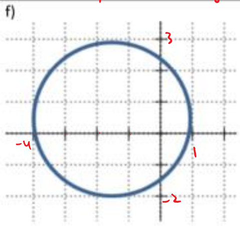
e)



Domain: $x \in \{-3, -2, -1, 0, 1, 2, 3\}$

Range: $y \in \{-2, -1, 0, 1, 3\}$

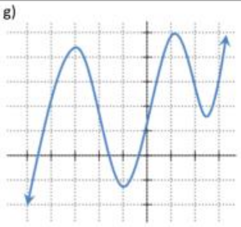
f)



Domain: $-4 \le x \le 1$

Range: $-2 \le y \le 3$

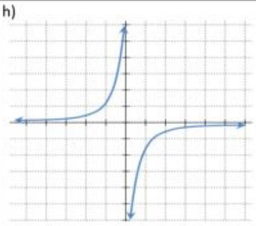
g)



Domain: $x \in \mathbb{R}$

Range: $y \in \mathbb{R}$

h)



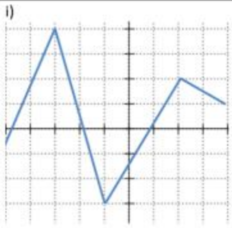
Domain: $x \in \mathbb{R} \; ; \; x \ne 0$ OR

$x < 0$ or $0 < x$.

Range: $y \in \mathbb{R} \; ; \; y \ne 0$ OR

$y < 0$ or $0 < y$

i)

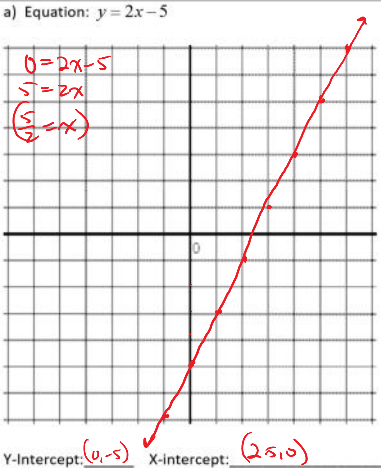


Domain: $x \in \mathbb{R}$

Range: $y \le 4$

9. Given each function, graph it on your calculator, graph it on the grid provided, and find the following:

a) Equation: $y = 2x - 5$



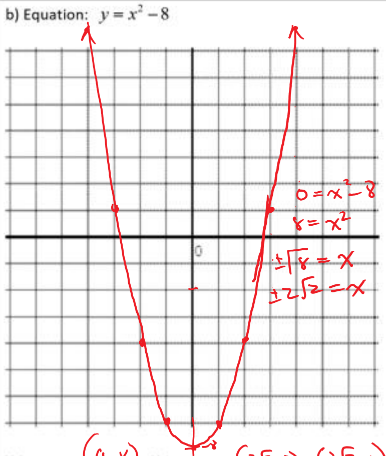
$0 = 2x - 5$

$5 = 2x$

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

Y-Intercept: $(0,-5)$ X-intercept: $(2.5, 0)$

b) Equation: $y = x^2 - 8$



$0 = x^2 - 8$

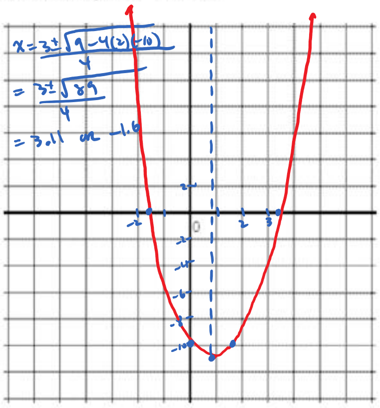
$8 = x^2$

$\pm\sqrt{8} = x$

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

Y-Intercept: $(0,-8)$ X-intercept: $(-2\sqrt{2}, 0)$ $(2\sqrt{2}, 0)$.

c) Equation: $y = 2x^2 - 3x - 10$



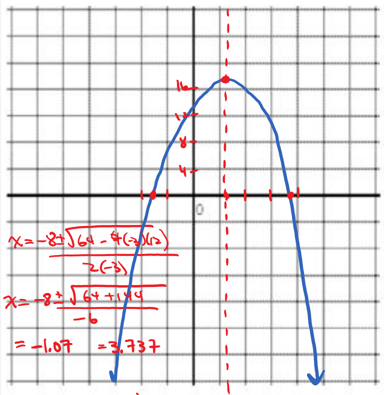
$x = \frac{3 \pm \sqrt{9 - 4(2)(-10)}}{4}$

$= \frac{3 \pm \sqrt{89}}{4}$

$= 3.11$ or -1.6

Vertex: $(0.75, -10.5625)$ X-intercept: $(-1.608, 0)$ $(3.11, 0)$

d) Equation: $y = -3x^2 + 8x + 12$



$x = \frac{-8 \pm \sqrt{64 - 4(-3)(12)}}{2(-3)}$

$x = \frac{-8 \pm \sqrt{64 + 144}}{-6}$

$= -1.07$ $= 3.737$

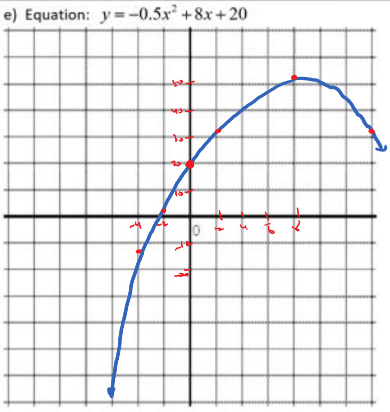
Vertex: $(1.3, 17.\overline{3})$ X-intercept: $(-1.07, 0)$ $(3.737, 0)$

$x_{VERTEX} = \frac{-(-3)}{2(2)} = 0.75$ $y_{VERTEX}: -10.5625$

$x_{VERTEX} = \frac{-8}{2(-3)} = \frac{4}{3} = 1.\overline{33}$

$y_{VERTEX} = 17.\overline{33}$

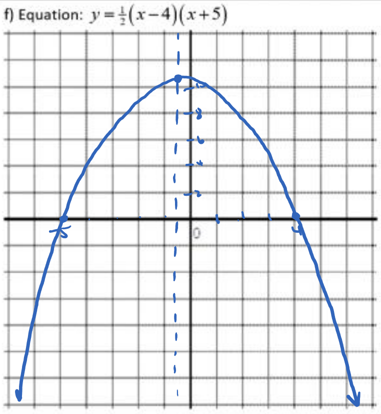
e) Equation: $y=-0.5x^2+8x+20$



Vertex: $(8,52)$ Range: $y \le 52$.

$x_{vertex} = \frac{-8}{2(-0.5)} = 8$ $\quad y_{vertex} = 52$.

f) Equation: $y=\frac{1}{2}(x-4)(x+5)$



Vertex: $(-0.5, 10.125)$ Range: $y \le 10.125$

$x_{vertex} = -0.5$

$y_{vertex} = \frac{1}{2}(-4.5)(4.5) = 10.125$

10. The roots of a quadratic equation are 5 and 1.25. Find the equation:

$y=(x-5)(x-\frac{5}{4})$ $\quad y = 4x^2-20x-5x+25$

$y=(x-5)(4x-5)$ $\quad \boxed{y=4x^2-25x+25}$

11. The height of a football (h) tossed by a quarterback is given by the equation $h=-4.9t^2+19t+1.4$, where "t" is the numbers of seconds after the ball is tossed. Find out how long it will take for the ball to hit the ground. WHEN THE BALL HITS THE GROUND $h(t)=0$.

$0=-4.9t^2+19t+1.4$

$a=-4.9 \quad b=19 \quad c=1.4$

$t = \frac{-19 \pm \sqrt{19^2-4(-4.9)(1.4)}}{2(-4.9)}$

$= \frac{-19 \pm \sqrt{361+27.44}}{-9.8} = \frac{-19 \pm 19.71}{-9.8}$

$\boxed{t_1 = 3.95}$ $\quad t_2 = -0.123s$ ← CAN'T HAVE NEGATIVE TIME

Domain: $\boxed{0 \le t \le 4s}$

b) What is the domain and range of this function?

TO GET THE RANGE, YOU NEED THE VERTEX.

$x_{vertex} = \frac{-b}{2a} = \frac{-19}{2(-4.9)} = 1.94s$

$h(1.94s) = -4.9(1.94)^2+19(1.94)+1.4$

$= -18.411 + 36.86 + 1.4$

$= 19.849m$

(MAXIMUM HEIGHT)

∴ RANGE $\boxed{0 \le y \le 19.849}$

12. 24 meters of fencing are used to enclose a rectangular garden.

i) Write an equation for the area (A) of the garden as a function of the length of one side.

l, w

$2l+2w=24$

$l+w=12$

$\boxed{l=12-w}$

THE DIMENSIONS WILL BE "W" AND "12-W"

ii) Then find the length of one side if the area of the garden is 30m

$A = l \times w$

$30 = (12-w)(w)$

$30 = 12w - w^2$

$w^2-12w+30=0$

$w = \frac{12 \pm \sqrt{144-4(30)}}{2}$

$w = \frac{12 \pm \sqrt{24}}{2}$

$w_1 = \frac{12+2\sqrt{6}}{2}$ $\quad w_2 = \frac{12-2\sqrt{6}}{2}$

$w_1 = 6+\sqrt{6}$ $\quad w_2 = 6-\sqrt{6}$

LENGTH $= 6+\sqrt{6}$ $\quad$ WIDTH $= 6-\sqrt{6}$

iii)What is the domain and range of this scenario?

$w-12$, w

SMALLEST WIDTH IS ZERO

LARGEST WIDTH IS 12

D: $0 \le w \le 12$.

② TO FIND THE RANGE, WE NEED THE MAXIMUM AREA.

$w = \frac{-b}{2a} = \frac{-(-12)}{2(1)} = 6$

$A = (12-6)(6)$

$= 36$

(MAX AREA)

RANGE: $\boxed{0 \le A \le 36}$