PreCalculus
Cumulative Review 2

#1) Find the domain of the given function. Use interval notation.

$$f(x) = \sqrt{8+x}$$

RADICAND ≥ 0

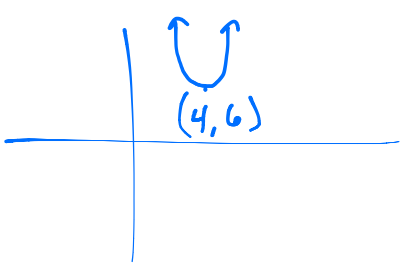
$x + 8 \geq 0$

$x \geq -8$

$[-8, \infty)$

#2) Find the range of the given function. Use interval notation.

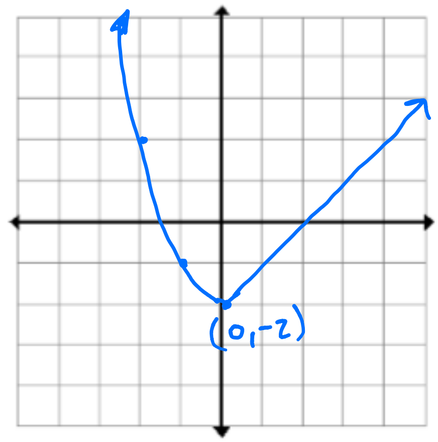
$$f(x) = 3(x-4)^2 + 6$$



Range: $[6, \infty)$

#3) Sketch the piecewise function and answer the questions.

$$f(x) = \begin{cases} x^2 - 2 & x \leq 0 \\ x - 2 & x > 0 \end{cases}$$



a. $f(-2) =$ 2

b. $f(2) =$ 0

c. $f(0) =$ -2

#4) Confirm that f and g are inverses by showing that $f(g(x)) = x$

$f(x) = 4x - 7$ and $g(x) = \frac{x+7}{4}$

$f(g(x)) = 4(g(x)) - 7$

$= 4\left(\frac{x+7}{4}\right) - 7$

$= x + 7 - 7$

$f(g(x)) = x$

$\therefore$ f & g are inverses

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#5) If $f(x) = -3x + 10$ and $g(x) = 4x^3 + x^2 + 5$, find the following:

$f(g(0)) = -3(g(0)) + 10$

$= -3(4(0)^3 + (0)^2 + 5) + 10$

$= -3(5) + 10$

$= -15 + 10$

$f(g(0)) = -5$

OR

$g(0) = 4(0)^3 + (0)^2 + 5$

$g(0) = 5$

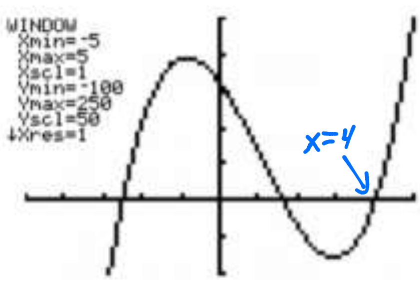
$f(g(0)) = -3(5) + 10$

$= -15 + 10$

$f(g(0)) = -5$

#6) Use the graph of the function to determine at least one zero, then find the exact values of all the zeros using the Factor Theorem.

$f(x) = 10x^3 - 31x^2 - 76x + 160$



$\boxed{4}$	10	-31	-76	160
		40	36	-160
	10	9	-40	R 0

$f(x) = (x-4)(10x^2 + 9x - 40)$

$f(x) = (x-4)[(10x^2 + 25x) + (-16x - 40)]$

$f(x) = (x-4)[5x(2x+5) - 8(2x+5)]$

$0 = (x-4)(2x+5)(5x-8)$

$0 = x - 4$, $4 = x$

$0 = 2x + 5$, $-5 = 2x$, $-\frac{5}{2} = x$

$0 = 5x - 8$, $= 5x$, $\frac{8}{5} = x$

$\therefore$ X-int: $\frac{8}{5}, -\frac{5}{2}, 4$

Answer the following questions about the given function.

$y = 3|-5x - 10| - 1$

$y = 3|-5(x+2)| - 1$

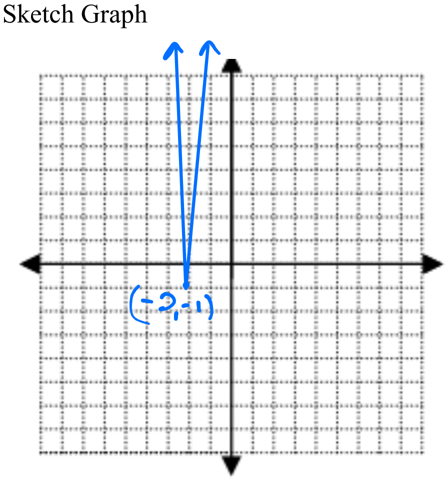
#7) Name Function: ABSOLUTE VALUE

#8) Translation: Left 2
Down 1

#9) Scale: Stretch vertically by 3
Shrink horizontally by $\frac{1}{5}$

#10) Reflection: Horizontal Reflection

#11) Sketch Graph



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#12) Solve.

$$\frac{3x}{\cancel{x+2}} = \frac{(-7-8x)}{\cancel{x^2-3x-10}} + \frac{1}{\cancel{x-5}}$$

$(x+2)(x-5)$

$3x(x-5) = (-7-8x) + (x+2)$

$3x^2 - 15x = -7x - 5$

$3x^2 - 8x + 5 = 0$

$(3x^2 - 3x) + (-5x + 5) = 0$

$3x(x-1) - 5(x-1) = 0$

$(x-1)(3x-5) = 0$

$x - 1 = 0$, $x = 1$ | $3x - 5 = 0$, $3x = 5$, $x = 5/3$

$\therefore x = 5/3, 1$

Denom $\neq 0$

$\boxed{x+2 \neq 0,\ x \neq -2 \quad x+5 \neq 0,\ x \neq 5}$

#13) Simplify.

$$\frac{(x-3)}{(\sqrt{x}-\sqrt{x-7})} \cdot \frac{(\sqrt{x}+\sqrt{x-7})}{(\sqrt{x}+\sqrt{x-7})}$$

$$= \frac{(x-3)(\sqrt{x}+\sqrt{x-7})}{(\sqrt{x})^2 - (\sqrt{x-7})^2}$$

$$= \frac{(x-3)(\sqrt{x}+\sqrt{x-7})}{x-(x-7)}$$

$$= \frac{(x-3)(\sqrt{x}+\sqrt{x-7})}{7}$$

#14) Evaluate

$\log_5 125 = \log_5 5^3$

$= 3$

Use $f(x) = \frac{5x}{x^3-12x^2+35x}$ to answer the following questions.

#15) Vertical Asymptotes/Holes:

$f(x) = \frac{5x}{x(x-7)(x-5)}$

Holes (cancel): $x = 0$

VA (Stays): $x - 7 = 0$, $x = 7$ | $x - 5 = 0$, $x = 5$

$\therefore$ Hole @ $x = 0$, VA @ $x = 5, 7$

#16) x-intercepts:

$0 = 5x$

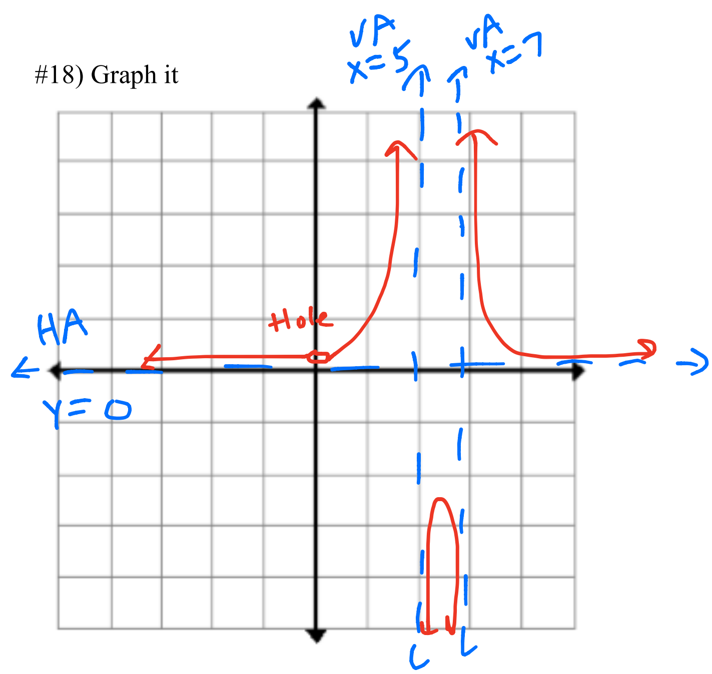
$0 = x$ (There is a hole @ 0, so No x-int)

#17) Horizontal/Slant Asymptotes:

$n \overset{?}{=} d$

$0 < 2$, so HA $y = 0$

#18) Graph it



Use the information given to answer the questions on this page.

The formula for the path of a flying bullet is given: $h = -9.8t^2 + vt + s$ where h = height of object after t seconds, v = initial velocity in meters per second and s = starting height in meters.

Bob shoots a gun straight up with an initial velocity of 500 meters per second and a starting height of 1 meters.

#19) What is the equation that represents this situation?

$h = -9.8t^2 + 500t + 1$

#20) What does the y-intercept represent to Bob?

The y-intercept represents the height of the bullet when Bob pulls the trigger

#21) What do the x-intercepts represent to Bob?

The x-intercepts represent how many seconds it takes for the bullet to reach a height of zero, which is ground height.

#22) How high is the bullet after 3 seconds?

$h = -9.8t^2 + 500t + 1$

$h(3) = -9.8(3)^2 + 500(3) + 1$

$= -9.8(9) + 1500 + 1$

$= -88.2 + 1501$

$h(3) = 1412.8$ meters

#23) How long will it take for the bullet to hit the ground after it is fired?

$h = -9.8t^2 + 500t + 1$

$0 = -9.8t^2 + 500t + 1$

Doesn't factor. Ask calculator for "zero" of function.

$t \approx 51.022$ seconds

#24) What is the maximum height of the bullet?

Use calc to find "max"

6378.551 meters

#25) At what time(s) will the bullet be 700 meters in the air?

$Y_1 = -9.8t^2 + 500t + 1$

$Y_2 = 700$

Ask calc for "intersect"

$t \approx 1.439$ seconds and 49.582 seconds