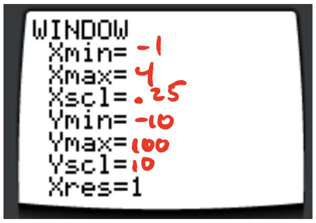
PreCalculus
Cumulative Review 1

HSF-ID.C.8

#1) Albert hits a fastball. The table below shows the height from the ground of the baseball over time. Graph the data with a friendly window. Record it below.

Time (sec)	0	0.25	0.5	0.75	1	1.25
Distance (ft)	3	26	45	60	71	78

a. Record a friendly window.



b. What type of regression model would be most appropriate?

Quadratic

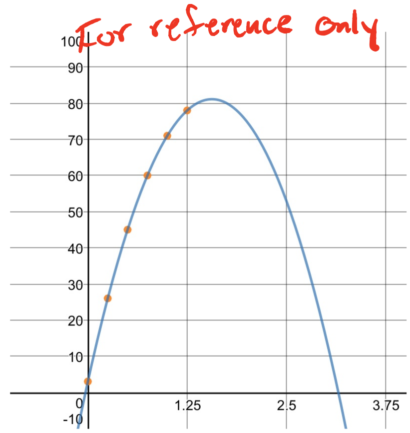
c. Use regression to write the equation of the model.

$y = -32x^2 + 100x + 3$

d. Predict the height (to 3 decimals) of the baseball at 3.0 seconds.

15 feet

For reference only



e. Find the times (to 3 decimals) at which the ball will be 60 feet in the air.

At .75 seconds and at 2.375 seconds.

f. When (to 3 decimals) will the ball hit the ground?

At 3.155 seconds

g. What does the y-intercept represent? (Sentence answer).

The height of the ball when it hits the bat.

#5) If $f(x) = 5x + 7$ and $g(x) = x^3 + 4x^2 - 3$, find the following:

$f(g(0)) = 5(g(0)) + 7$

$= 5((0)^3 + 4(0)^2 - 3) + 7$

$= 5(-3) + 7$

$= -15 + 7$

$f(g(0)) = -8$

OR

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

$g(0) = -3$

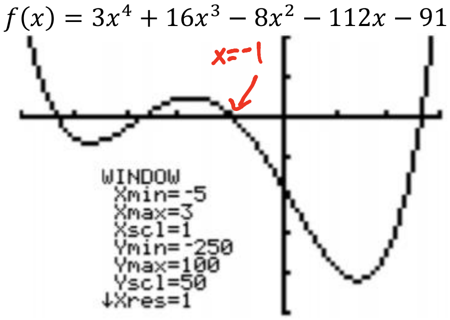
$f(-3) = 5(-3) + 7$

$= -15 + 7$

$f(-3) = -8$

#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.

$f(x) = 3x^4 + 16x^3 - 8x^2 - 112x - 91$



$\boxed{-1}$	3	16	-8	-112	-91
		-3	-13	21	91
	3	13	-21	-91	$\boxed{0}$

$f(x) = (x+1)[3x^3 + 13x^2 - 21x - 91]$

$f(x) = (x+1)[(3x^3 + 13x^2) + (-21x - 91)]$

$f(x) = (x+1)[x^2(3x+13) + {}^-7(3x+13)]$

$0 = (x+1)(3x+13)(x^2-7)$

$0 = x+1$, $-1 = x$

$0 = 3x+13$, $-13 = 3x$, $-\frac{13}{3} = x$

$0 = x^2 - 7$, $7 = x^2$, $\pm\sqrt{7} = x$

$\therefore$ x-int $= -1, -\frac{13}{3}, \pm\sqrt{7}$

Answer the following questions about the given function.

$y = -2(3x - 12)^3 - 15$

$y = -2[3(x-4)]^3 - 15$

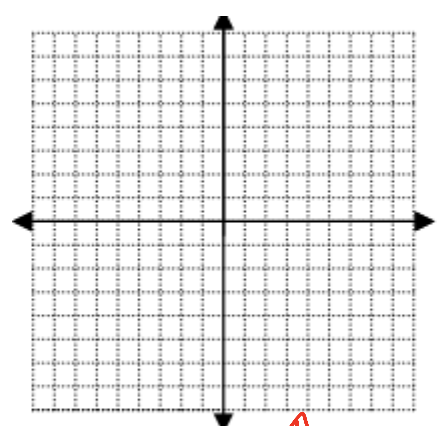
#7) Name Function: Cubic

#8) Translation: Right 4
Down 15

#9) Scale: Stretch vertically by 2
Shrink horizontally by $\frac{1}{3}$

#10) Reflection: Vertical Reflection

#11) Sketch Graph



(4,-15)

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#12) Solve.

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

$(x+5)(x-2)$ multiplied into each term.

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

$3x^2 - 6x = x - 2$

$3x^2 - 7x + 2 = 0$

$(3x^2 - 1x) + (-6x + 2) = 0$

$x(3x-1) + -2(3x-1) = 0$

$(3x-1)(x-2) = 0$

$3x - 1 = 0$; $x - 2 = 0$

$3x = 1$; $x = 2$

$x = \frac{1}{3}$

Denom $\neq 0$

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

$\therefore x = \frac{1}{3}$

#13) Simplify.

$$\frac{(x+2)}{(\sqrt{x} - \sqrt{x+5})} \cdot \frac{(\sqrt{x}+\sqrt{x+5})}{(\sqrt{x}+\sqrt{x+5})}$$

$$= \frac{(x+2)(\sqrt{x}+\sqrt{x+5})}{(\sqrt{x})^2 - (\sqrt{x+5})^2}$$

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

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

#14) Evaluate

$\log_3 81 = \log_3 3^4$

$= 4$

Use $f(x) = \frac{4x}{x^3-25x}$ to answer the following questions.

#15) Vertical Asymptotes/Holes:

$f(x) = \frac{4x}{x(x^2-25)}$

$f(x) = \frac{4x}{x(x-5)(x+5)}$

Cancel: Holes: $x = 0$

Left: VA: $(x-5)(x+5) = 0$

$x - 5 = 0$, $x = 5$; $x + 5 = 0$, $x = -5$

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

#16) x-intercepts:

$0 = 4x$

$0 = x$, there is a hole @ $x=0$, so no x-int

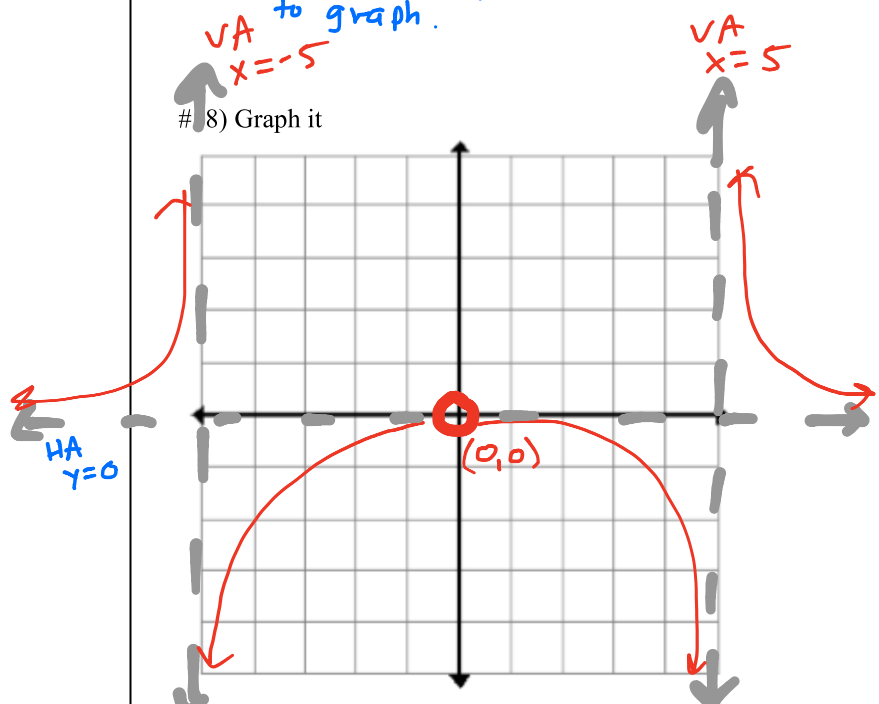
#17) Horizontal/Slant Asymptotes:

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

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

Not a parent graph, so use calc to graph.

#18) Graph it



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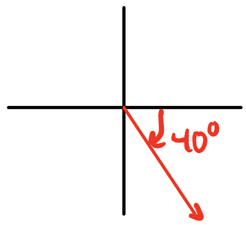
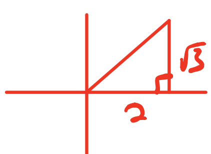
#19) Find the reference angle for the angle -40º.

$0^\circ <$ Reference angle $< 90^\circ$



Reference angle = 40°

#20) Suppose $\tan(B) = \frac{\sqrt{3}}{2}$ and the terminal side of the angle lies in quadrant I.



$x^2 + y^2 = r^2$

$(2)^2 + (\sqrt{3})^2 = r^2$

$4 + 3 = r^2$

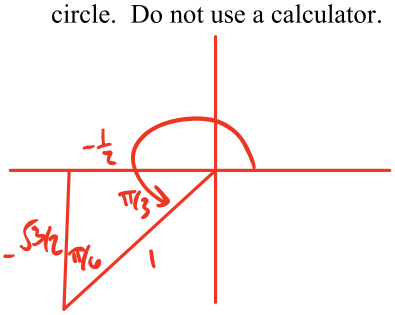
$7 = r^2$

$\sqrt{7} = r$

$\sec(B) = \frac{r}{x} = \frac{\sqrt{7}}{2}$

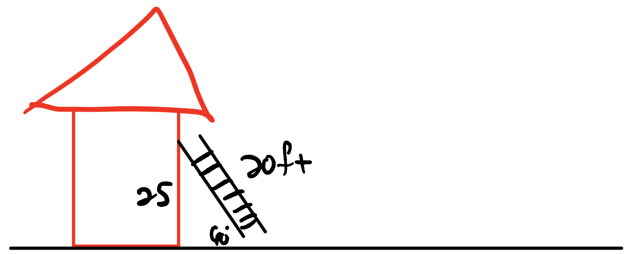
sec (B) = $\frac{\sqrt{7}}{2}$

#21) Find the exact value of each function using the unit circle. Do not use a calculator.



$\cos\left(\frac{4}{3}\pi\right) = -\frac{1}{2}$

#22) Alyssa was assigned the following problem to do in math class "A 20-foot ladder is leaning on the outside of a house. If the angle formed by the ladder and the level ground is 60º, to the nearest hundredth how far up the side of the house does the ladder reach?"
After finishing the problem, Alyssa immediately knew her answer of 25 feet was unreasonable. What makes her answer impossible? Include at least one mathematical principle in your explanation.



If the ladder reaches 25 feet high, that makes the leg of the right triangle longer than the hypotenuse.

But, we know the hypotenuse is always the largest side of a right triangle.