

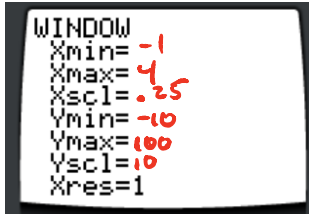
PreCalculus Cumulative Review 1

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?

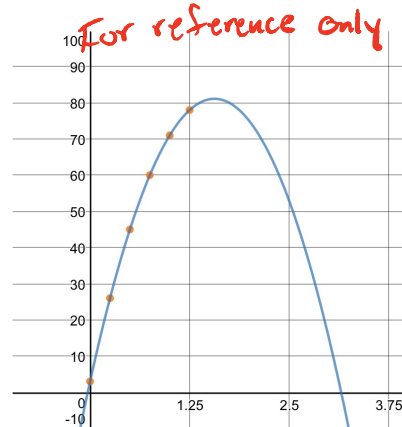
Quadratic

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



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.

PreCalculus

Cumulative Review 1

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

$$\begin{aligned} f(g(0)) &= 5(g(0)) + 7 \\ &= 5((0)^3 + 4(0)^2 - 3) + 7 \\ &= 5(-3) + 7 \\ &= -15 + 7 \end{aligned}$$

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

OR

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

$$g(0) = -3$$

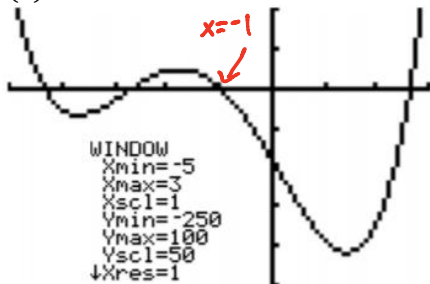
$$f(-3) = 5(-3) + 7$$

$$= -15 + 7$$

$$f(-3) = -8$$

#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.

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



-1	3	16	-8	-112	-91
		-3	-13	21	91
	3	13	-21	-91	91

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

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

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

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

$$\begin{aligned} 0 = x+1 & \quad 0 = 3x+13 & \quad 0 = x^2-7 \\ -1 = x & \quad -13 = 3x & \quad 7 = x^2 \\ & \quad -\frac{13}{3} = x & \quad \pm\sqrt{7} = x \end{aligned}$$

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

Answer the following questions about the given function.

$$\begin{aligned} y &= -2(3x - 12)^3 - 15 \\ y &= -2[3(x-4)]^3 - 15 \end{aligned}$$

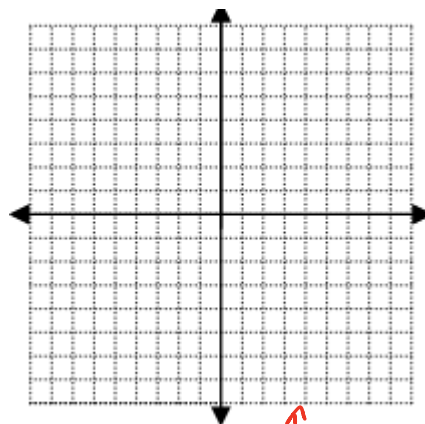
#7) Name Function: **Cubic**

#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)

PreCalculus Cumulative Review 1

#12) Solve.

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

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

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

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

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

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

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

$$3x-1=0 \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} x-2=0$$

$$3x=1$$

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

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

#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:

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

cancel
Holes
 $x=0$

Left
VA

$$(x-5)(x+5)=0$$

$$x-5=0 \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} x+5=0$$

$$x=5 \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} x=-5$$

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

\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

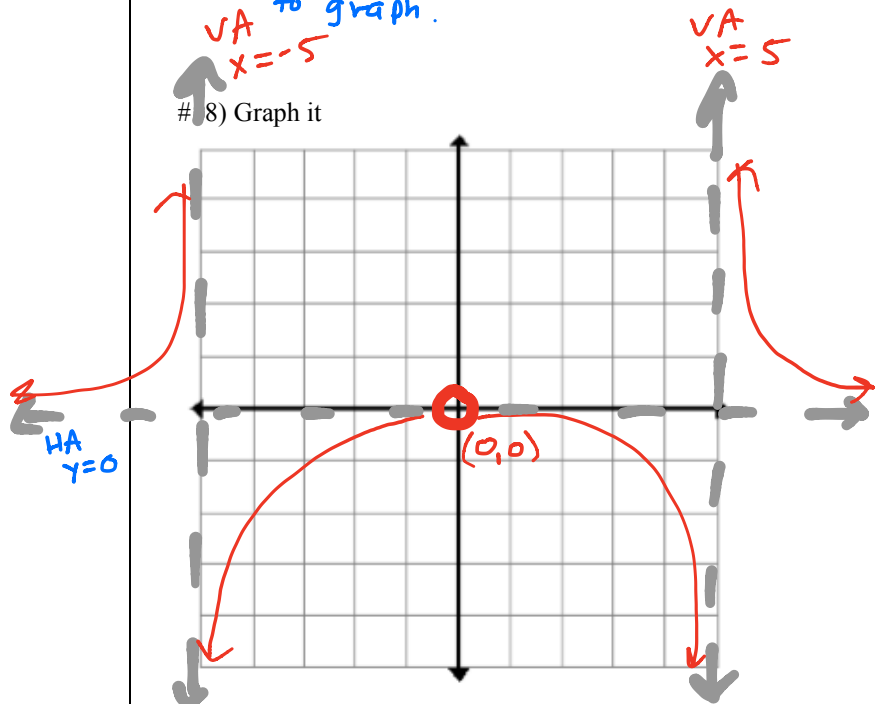
#17) Horizontal/Slant Asymptotes:

$$n \neq d$$

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

Not a parent graph, so use calc to graph.

#8) Graph it



PreCalculus

Cumulative Review 1

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 200 meters per second and a starting height of 3 meters.

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

$$h = -9.8t^2 + 200t + 3$$

#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 4 seconds?

$$\begin{aligned}h &= -9.8t^2 + 200t + 3 \\h(4) &= -9.8(4)^2 + 200(4) + 3 \\&= -9.8(16) + 800 + 3 \\&= -156.8 + 803 \\h(4) &= 646.2 \text{ meters}\end{aligned}$$

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

$$\begin{aligned}0 &= -9.8t^2 + 200t + 3 \\&\text{Doesn't factor. Ask calculator for "zero" of function.} \\t &\approx 20.423 \text{ seconds}\end{aligned}$$

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

Use calc to find "max"

$$1623.408 \text{ meters}$$

#25) At what time(s) will the bullet be 500 meters in the air?

$$\begin{aligned}y_1 &= -9.8t^2 + 200t + 3 \\y_2 &= 500 \\&\text{Ask Calc for "intersect"} \\t &\approx 2.896 \text{ seconds and } 17.512 \text{ seconds}\end{aligned}$$