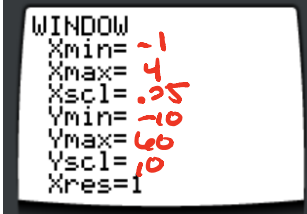# PreCalculus
Cumulative Review 2

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)	2	20	34	44	50	52

a. Record a friendly window.

```
WINDOW
 Xmin= -1
 Xmax= 4
 Xscl= .25
 Ymin= -10
 Ymax= 60
 Yscl= 10
 Xres=1
```

For reference only

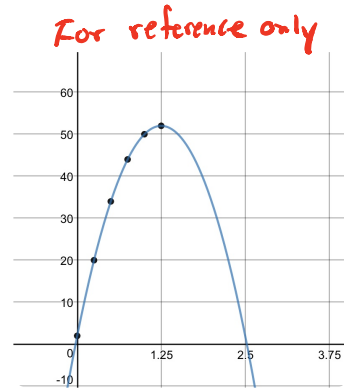b. What type of regression model would be most appropriate?

Quadratic

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

$y = -32x^2 + 80x + 2$

d. Predict the height (to 3 decimals) of the baseball at 2.0 seconds.

34 feet

e. Find the times (to 3 decimals) at which the ball will be 10 feet in the air.

0.104 seconds and 2.396 seconds

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

2.525 seconds

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

The height of the ball when it's hit.

#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.

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

WINDOW
Xmin=-5
Xmax=5
Xscl=1
Ymin=-100
Ymax=250
Yscl=50
↓Xres=1

x=4
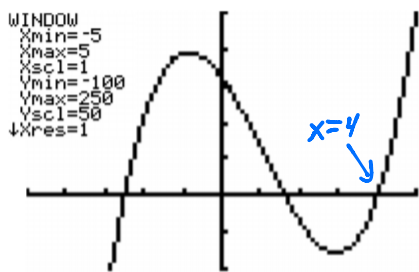
4	10	-31	-76	160
		40	36	-160
	10	9	-40	0

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

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

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

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

$0 = x-4 \quad\quad 0 = 2x+5 \quad\quad 0 = 5x-8$

$4 = x \quad\quad -5 = 2x \quad\quad = 5x$

$\quad\quad\quad -\frac{5}{2} = x \quad\quad \frac{8}{5} = x$

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

Answer the following questions about the given function.
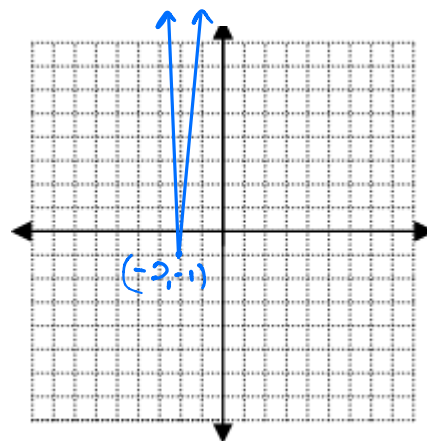
$$y = 3|-5x - 10| - 1$$

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

#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

(-2,-1)

#12) Solve.

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

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

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

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

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

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

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

$x-1=0 \quad \mid \quad 3x-5=0$
$x=1 \quad \mid \quad 3x=5$
$\qquad\qquad x = 5/3$

$$\therefore x = 5/3, 1$$

Denom ≠ 0
$x+2 \neq 0 \quad \mid \quad x+5 \neq 0$
$x \neq -2 \quad \mid \quad x \neq 5$

#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)
$x-7=0 \quad \mid \quad x-5=0$
$x=7 \quad \mid \quad x=5$

∴ Hole @ x=0, VA @ x=5,7

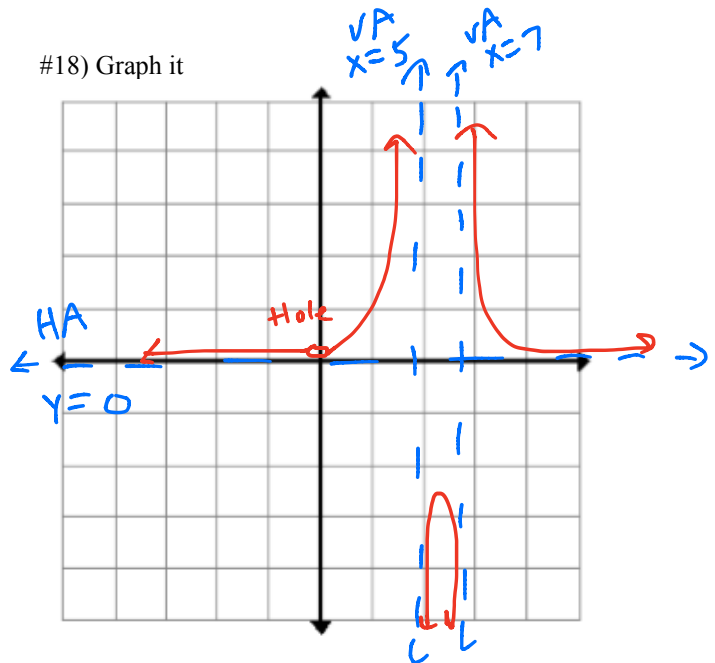#16) x-intercepts:

$$0 = 5x$$
$$0 = x \quad (\text{There is a hole @ 0, so No X int})$$

#17) Horizontal/Slant Asymptotes:

$$n \overset{?}{=} d$$
$$0 < 2, \text{ so HA } y=0$$

#18) Graph it

PreCalculus
Cumulative Review 2

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?

$$h = -9.8t^2 + 500t + 1$$
$$h(3) = -9.8(3)^2 + 500(3) + 1$$
$$= -9.8(9) + 1500 + 1$$
$$= -88.2 + 1501$$
$$h(3) = 1412.8 \text{ meters}$$

#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.

$$t \approx 51.022 \text{ seconds}$$

#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"

$$t \approx 1.439 \text{ seconds and } 49.582 \text{ seconds}$$