★Standard 1.01: Create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, and logarithmic functions of bivariate data to solve problems.

a. Interpret the constants, coefficients, and bases in the context of the data.
b. Check models for goodness-of-fit; use the most appropriate model to draw conclusions and make predictions.

1. The following data shows the height *h* of a cliff jumper as a function of the time *t* (in seconds) after she has jumped off a cliff.

t	h
0.1	285
1.1	299
2.3	284
3.0	240
3.9	165
4.5	101
5.1	45

a. Does an exponential, quadratic, or linear function best fit the data?

quadratic

b. Rounding to the nearest thousandth, write your model below.

$H(t) = -16.094t^2 + 33.870t + 282.917$

c. What does the y-intercept mean in the context of this problem?

The height of the cliff is 282.917 ft.

d. What was the cliff jumper's greatest distance from the ground?

(2nd, Trace, Maximum) Y=h = 300.7 ft

e. When will the cliff jumper hit the ground?

(Y2=0, Calculate Intersect)

After 5.375 seconds

f. What is the practical domain in the context of this problem? The practical range?

Domain: $0 \le t \le 5.375$ seconds

Range: $0 \le h \le 300.7$ ft

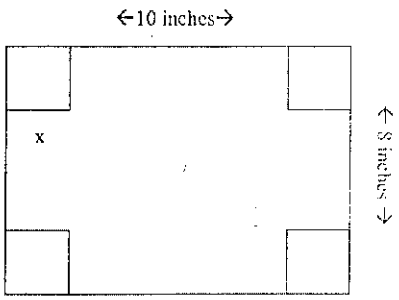
g. What is the theoretical domain of the h(t) function? The theoretical range?

Domain: $\mathbb{R}$

Range: $y \le 300.7$

Where you should go for more review on this concept: Look at your Linear and Quadratics Test and Test Review. See post online from 10/12/12 for the key to that review. Google or search in khanacademy.org for "quadratics word problems."

2. A craftsperson starts with an 8"x10" piece of cardboard and cuts equal squares out of each corner. He needs to figure out how large the cut-out squares should be to maximize the volume of the box.



a. Write a function V(x) that expresses the volume *V* in cubic inches as a function of the side length *x* of the squares that are cut from the corners.

$L = 10 - 2x$
$W = 8 - 2x$
$H = x$

$V = L \times W \times H$

$V(x) = (10 - 2x)(8 - 2x)(x)$

b. What side length would maximize the volume of the box? How did you get your answer?

(2nd, Trace, Maximum)

When the side length (= height) of the box is 1.47", the volume is maximized.

c. What is the practical domain in the context of this problem? The practical range?

Domain: $0 \le x \le 4$ (you can't cut out a square bigger than 4")

Range: $0 \le V \le 52.5$ (max volume)

d. What is the theoretical domain of the V(x) function? The theoretical range?

Domain: $\mathbb{R}$

Range: $\mathbb{R}$

Where you should go for more review on this concept: Look at the post online from 10/24/12, click on the link, and do problem #2. See also the Box Problem (10/22/12 post).