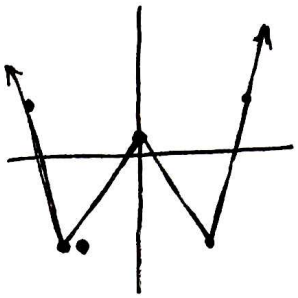
Name_____

Pre-Calculus Honors **Ms. Hindal**
Objective 1.6: Modeling **Unit 1 Day 6**

Do Now:

1. Where is the function at right increasing? Is it bounded? Continuous? Even? Odd?
2. What is the domain of the following: $f(x) = \sqrt{(x-3)} + 17/(x+2)$ D: $[3, \infty)$



Inc: $[-4, 0] \cup [4, \infty)$ lower bounded, continuous, even

Modeling and Regression:

Regression line: line of "best fit"

Coefficient of Determination, r^2: measures how well a line or curve fits the data.
r^2 is between 0 and 1. A line that fits perfectly has an r^2 of 1.

Types of Regression:

Linear
Quadratic (related to the square function)
Cubic (related to the cube function)
Logarithmic
Exponential
Power (related to the square root function and others)
Logistic
And more!

We can use modeling to predict and compare data

Best Deal Example: As your graduation present, your grandparents offer to buy you a used car for college. Their only requirement is that you do the research and find the best deal possible. After searching newspapers and local dealerships, you find 10 cars that you like. Here are the ages of the cars and their selling prices:

Age in years (x)	1	2	3	4	5	6	9	9	11	13
Price in dollars f(x)	12995	10495	10995	7990	6995	5990	3200	3995	2900	1750

Create a scatter plot of the data on your calculator. What parent function(s) does it look similar to?

linear, quadratic, cubic, exponential, etc.

Then find a linear regression model, f(x), of the data (round to the hundredths).

$y = -922.46x + 12,542.00$

Find the quadratic regression model (round to the hundredths). Is it better or worse? List two reasons why.

$y = 62.24x^2 - 1777.11x + 14,546.55$

quadratic is better
- it is closer to the points on the plot
- it's r^2 is closer to 1 (.98 vs. .93)

Population Prediction Example:

Year	Alaska
1900	63.6
1910	64.4
1920	55.0
1930	59.2
1940	72.5
1950	128.6
1960	226.2
1970	302.6
1980	401.9
1990	550.0
2000	625.9

The table at left describes the population (in thousands) of a state based on the year. Plot the data on your calculator. What type of regression might fit this data?

square, cube, exponential, logistic

Find a regression model of your choice (round to the hundredths) with x representing the years after 1900 and plot it with the data. Is it a good fit? List 2 reasons why.

Variable answers. reasons should relate to the graph and r^2.

Find another model with a different regression type. Is it a better model? Why or why not?

see above.

Homework: Study!

Tips:

1. Study by going through problems that we did in class. Cover up the answers and try them again before checking!
2. Make flash cards to study the parent functions! Make sure you know how to graph them all!!
3. Go through the review questions and check your answers (answers on my website @ bit.ly/Hindal364)

1.1: 1. A building can be built 600 ft tall if it is 100 ft wide

2. $f(-2)+g(4-1)-3=0$

3. $d(-3a)=9a^2-6a$

4. $x=\pm 4$

5. typo! point should be $(-6,7)$. There are many answers. As long as your graph includes the pts $(2,-1),(-3,5)$ & $(-6,7)$ it is correct.

1.2: 1. a. $(2,5)\cup(5,\infty)$ b. $(-\infty,4)\cup(14,\infty)$

2. $x\leq 0$ and $x\neq 5$ or $5<x\leq 9$, $(-\infty,-5)\cup(-5,0]\cup(5,9]$

3. nope! 4 is not included, so it is not the smallest

4. numbers like 1 & 1.5 are included in the first interval, but not the second

1.3: 1. $f(x)$

a: Domain = $[-5,5)$ Range: $(-3,3)$

b. Increasing: $[-3,3]$
Decr: $(-5,-3]\cup[3,5)$

c. local max @ $(3,2)$
local min @ $(-3,-2)$

d. not applicable b/c function ends

e. odd!

f. yes!

g. bounded!

$g(x)$

a. Domain: $(-\infty,\infty)$ Range: $(-\infty,2]$

b. Incr: $(-\infty,0]$ Decr: $[0,\infty)$

c. absolute max @ $(0,2)$

d. $x\to\infty$ $f(x)\to-\infty$
$x\to-\infty$ $f(x)\to-\infty$

e. even

f. yes

g. upper bounded

2 & 3 → many answers

1.4: 1. square, square root, reciprocal, absolute value, exponential, logistic

2. cube, linear, square

3. linear, cube, square root, exponential, logarithmic

1.5: 1. a. $[-8,8]$ b. $[2,\infty)$ c. $(-\infty,-3)\cup(-3,\infty)$

2. something like $f(x)=\sqrt{x-6}$

3. something like $f(x)=\dfrac{1}{x-6}$