Advanced Functions – Review for Unit # 5 Test WS Name: Key

Directions: Using the appropriate model, as stated in the problem, complete each question.

1.) Joanna needs to rent commercial space for her new business and wants to be sure that all possible locations are reasonably priced. As part of her research, she calls several realtors, colleagues, and business-owners inquiring about the amount of space they rent (in square feet) and the price. As she expected, price varies considerably according to location but it does have linear relationship. Joanna's data is below:

L1 x

Space (sq ft)	1350	2800	1750	2300	2100	2100	750	1700	2100	3450	2200	2350
L2 y Cost ($)	12.45	26.80	15.30	23.50	20.85	19.57	10.10	14.60	19.95	36.10	21.35	23.79

a.) What is the regression equation and its correlation coefficient? $y = .012064458x - .562352267$
$r = .977345466$

b.) If Joanna found a 2630 sq feet of commercial rental space, how much would she expect to pay each month? $x = 2630$, $y = ?$ $25.91

c.) Joanna has a firm budget of no more than $11.05 per square foot. How much space can she rent if she uses all the budgeted amount? $y = 11.05$, $x = ?$ 1153.8 sq ft

2.) To study the relationship between height (inches) and weight (pounds), Luke randomly selected 10 male students from area high schools. The data he collected is in the chart below.

L1

Height (in)	61	66	63	81	76	80	65	84	79	64
L2 Weight (lb)	112	126	120	165	142	155	125	172	150	123

a.) Which is the BEST model for the data set above? Circle one: linear power logarithmic
Explain why: its "r" is closest to 1 ($r = .9812$ $r = .9840$ $r = .9779$)

b.) Using the best model from above, what is the predicted height of a male student if he weighed 182 lbs? $y = 182$, $x = ?$ 90.5 inches

c.) Using the best model from above, what is the predicted weight for a male student who is 6 ft 8 in tall? $12 \times 6 + 8 = 80$, $x = 80$, $y = ?$ 157.3 lbs

3.) Frank created his company's website several months ago. He is interested in tracking the number of "hits" (visits to the site) over time. The table below shows the number of hits each month for the first 10 months. Exponential is the best model for this data.

L1 x

Month	1	2	3	4	5	6	7	8	9	10
L2 y Hits	19	47	99	139	229	327	645	912	1386	2899

a.) What is the regression equation and its correlation coefficient? $y = 15.96748768(1.673897321)^x$
$r = .993958702$

b.) How many hits will be tracked during the website's thirteenth month? $x = 13$, $y = ?$ 12,933.4 hits

c.) How many months will be required for the website to track 60,000 hits? $y = 60000$, $x = ?$ 16 months

d.) If Frank started his website in January, what month would his website track to be 5,000 hits? $y = 5000$, $x = ?$ $x = 11.2 \rightarrow$ November

4.) The stature (height) of young women from birth to adulthood. The chart below provides data for ten females, comparing age (years) to height (cm).

L1 x
L2 y

Age (years)	4	18	14	6	16	2	12	20	22	10
Height (cm)	95.5	170.5	157.5	118.0	159.5	84.0	150.0	171.2	171.8	136.8

a.) A logarithmic model is best for this data, what is its regression equation? $y = 47.87390457 + 40.61445066 \ln x$

b.) Using model above, what height would you predict a 7 year old female to be? $x=7 \quad y=?$ 126.9 cm

c.) A female is selected at random. You are told that she is 164 cm tall. Using the model above, what do you predict her age to be? $y=164 \quad x=?$ 17.4 years

5.) The U.S. population has grown exponentially since the beginning of the 20th century. Let x = number of year since 1900. Look at the data below:

0 10 20 30 40 50 60 70 80 90 100 110

L1 x
L2 y

Year	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Population (in millions)	76.5	92.2	106.0	123.2	132.2	151.3	179.3	203.3	226.5	248.7	281.4	290.8

a.) What is the regression equation and its correlation coefficient? $y = 81.94567447(1.012386003)^x$, $r = .9955471521$

b.) How many people are predicted to be living in the United States in 2050? $x=150 \quad y=?$ 519.3 million

c.) In what year will the U.S. population reach 617,000,000? $y=617 \quad x=?$ $x=164 \rightarrow 2064$

6.) Peter launches a ball and writes down the various heights the ball reaches. Below is the data he collected. A quadratic model is best for this set of data.

L1 x
L2 y

Time (seconds)	1	3	5	8	10	13	19
Height (feet)	3.5	5.2	8.9	11.3	11.1	8.1	2.6

a.) What is the regression equation and its correlation coefficient? $y = -.0970891896x^2 + 1.884678963x + 1.468551486$, $r = .9672563688$, $r^2 = .9355848875$

b.) Using the model, what is the height of the ball at seven seconds? $x=7 \quad y=?$ 9.9 ft

c.) Using the model, what is the maximum height of the ball? find max on parabola... 10.6 ft

d.) Using the model, when will the ball reach the ground? $y=0 \quad x=?$ 20.2 seconds

e.) Using the model, at how many seconds will the ball reach 9 feet when it's heading toward the ground? $y=9$ $x=?$ (right side of parabola b/c heading down) 13.8 seconds