AFM Test Review – Module 1

Name _____

1. In 1990 the average price of a new car was $12,280. In 2004 the average price was $16,700. If the price changes in a linear manner:
   a. Which is the independent variable? Dependent variable? Why?

      time price

   b. Find the equation which models this behavior.

      (1990, 12280) (2004, 16700)

      (0, 12280) (14, 16700) $y = 315.71x + 12280$

   c. What do the slope and y-intercept numbers mean for this model?

      Slope - change in cost per year

      y-int - cost when year is 0 (started measuring)

   d. What will you expect the average price to be in the year 2008?

      $t = 18$

      $Y = 315.71 \cdot 18 + 12280$

      $\$17962.78$

2. Below is a chart of the weight of a radioactive material on given days. Draw a scatter plot. Determine which is a better fit: linear, exponential, cubic ,or quadratic regression. Why? Find the appropriate regression equation.

Day	0	1	2	3	4	5	6	7
Weight	1000	897.1	802.5	719.8	651.1	583.4	521.7	468.3

$y = 99891(.8978)^x$

3. Evil Knievel is thrown out of a canon. The chart below represents his time versus height traveled. Find an appropriate quadratic function to model the data. What is your equation? Round to the nearest hundredth.

Time, x	0	20	40	60	80	100	120	140	160	180
Height, y	40	60	75	80	83	90	92	95	90	84

   a. What is the value of y when x=0 and what does this tell us about the situation?

      ~~$y = .00007x^3 - .0049x^2 + 9181x + 41.96$~~

      y = 43 meaning: $y = -.0032x^2 + .7963x + 43.29$

      43 feet when time is 0.

   b. Find the time it takes for Knievel to reach his maximum height. 125 sec

   c. What is his maximum height? 93.4

   d. Find the time it takes for Knievel to hit the ground. 297.7

20

4. Good runners take more steps per second as they speed up. Here are the average numbers of steps per second for a group of top female runners at different speeds. The speeds are in feet per second. You want to predict steps per second from running speed.

Speed (ft/sec)	15.86	16.88	17.50	18.62	19.97	21.06	22.11
Steps per second	3.05	3.12	3.17	3.25	3.36	3.46	3.55

a. Find the **line** of best fit. $y = .08x + 1.77$

b. What is the slope? What does it mean? .08 Increase in steps per second per ft/sec

What is the y-intercept? What does it mean? 1.77 steps per second when speed = 0

c. What is the independent variable? Speed

What is the dependent variable? steps per second

d. Use your equation to find the steps per second taken by a runner who is running 18.2 ft/sec. Is this interpolation or extrapolation? 3.22 steps Interpolation

e. Use your equation to find the steps per second take by a runner who is running 29.5 ft/sec. Is this interpolation or extrapolation? 4.13 steps extrapolation

f. What is the residual at 17.5 ft/sec? What does it mean?

-.001 The predicted value is .001 steps below the real value

5. The table below states the annual world crude oil production (in millions of barrels) since the year 1880.

Year	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990
Oil	30	77	149	328	689	1412	2150	3803	7674	16690	21722	22100

a. Find the exponential regression equation which best models this data.

$y = 45.78(1.06)^x$

b. Use your equation to predict the millions of barrels produced in the year:

i. 1908 260.87 ii. 1964 8470.21 iii. 2006 11521048 iv: 2015 20,560.69

c. Find the domain, range, and rate of growth.

R: $y > 0$ ROG: 1.06

D: $x > 0$

6. The table below shows the number of cars in the parking lot at Crabtree Valley Mall at given intervals of hours after the mall opening.

Hours	0	1	2	3	4	5	6	7	8
Number of cars	148	1085	2270	5763	7905	6120	2345	970	210

a. What is the independent variable? hours

What is the dependent variable? # of cars

b. From observing the scatterplot would you observe that the data is linear, exponential, cubic, or quadratic? Find the appropriate equation that models the data.

Quadratic $-403.27x^2 + 3273.00x - 811.64$

c. According to your model,

i. How many cards would you expect to find in the parking lot at exactly 9.8 hours after the mall opening?

Q: -7858.362

ii. What is the maximum number of cars you would expect to find in the lot? How many hours after opening would this maximum occur?

5668 cars
4 hrs

7. The population present in a bacteria culture over 5 days is give in the table below:

Time (days)	0	1	2	3	4	5
Population	30	133	214	337	527	819

a. Determine which is a better fit: linear, exponential, cubic, or quadratic regression. Why? Find the appropriate regression equation.

$y = 49.42(1.428)^x$

b. Estimate the population after 7 days.

3374.9