

# Warm Up

1)

Season	1	2	3	4	5	6
PPG	8.7	10.1	12	13.5	15.8	17.2

a. What model would fit best?

**Linear**

b. Write the regression equation.

$$1.75x + 6.77$$

c. What would be the expected PPG for the 7th season?

**19.02**

## Warm Up

2)

Years	2012	2013	2014	2015	2016
Value	45,000	40,320	37,550	35,980	35,020

**\*Use years since 2012\***

**a. What model would fit best?**

**Exponential**

**b. Write the regression equation.**

$$43,671.13(0.94)^x$$

**c. How much would the car be worth now?**

**\$30,127.39**

## Warm Up

3)

Season	1	2	3	5	6	7
PPG	6.2	9.8	11	10.8	9.4	6.3

a. What model would fit best? **Quadratic**

b. Write the regression equation.

$$-0.59x^2 + 4.7x + 2.33$$

c. What would be the expected PPG for the 4th season? **11.69**

d. ... for the 8th season? **2.17**

e. ... for the 10th season? **-9.67**

f. Which prediction above would be most reliable? **4th**

g. ... least reliable? **10th**

6)

X	1	2	3	4	5	6	7
Y	84	36	28	32	26	35	82

$$y = 0.93x^4 - 14.98x^3 + 86.96x^2 - 218.52x + 229.57$$

Type: Quartic

Equation: \_\_\_\_\_

Predict x=8: 186.37

7)

X	1	2	3	4	5	6	7
Y	12	27	30	31	32	37	52

$$y = 0.77x^3 - 9.21x^2 + 36.01x - 15.29$$

Type: Cubic

Equation: \_\_\_\_\_

Predict x=8: 77.59

8)

X	1	2	3	4	5	6	7
Y	5	8	14	23	35	50	68

Type: Exponential Equation:  $y = 3.48(1.56)^x$ Predict x=8: 122.06

9)

X	1	2	3	4	5	6	7
Y	35	60	75	80	75	60	35

Type: QuadraticEquation:  $y = -5x^2 + 40x$ Predict x=8: 0

1) The following table displays the monthly financial profit reports for a company around the time a new product was released (in \$10,000s):

Month	1	2	3	4	5	6	7	8
Profit	8	6.4	5.5	6.2	7.8	8.4	8.7	8.5

- a. What type of regression model would best fit this data? Cubic
- b. Write the equation for the best regression:  $-0.08x^3 + 1.24x^2 - 5.02x + 11.91$
- c. Use your equation to estimate the profit on month 12: -8.01
- d. If you had to guess off of the data, when would you say the product was released? Why? \_\_\_\_\_

**Vary**

2) Every 3 years an animal conservation group tracks the deer population in a specific region of the Rocky Mountains (use years since 2003):

Year	2003	2006	2009	2012	2015	2018
Population	158	142	134	136	146	164

- a. What type of regression model would best fit this data? Quadratic
- b. Write the equation for the best regression:  $0.48x^2 - 6.78x + 157.93$
- c. Use your equation to estimate the deer population in 2016: 150.91
- d. Use your equation to estimate the deer population in 2024: 227.23

3) In the same region during the same time periods the conservation group also tracks the wolf population (use years since 2003):

Year	2003	2006	2009	2012	2015	2018
Population	42	48	51	50	46	39

- a. What type of regression model would best fit this data? \_\_\_\_\_
- b. Write the equation for the best regression:  $-0.18x^2 + 2.56x + 42.04$
- c. Use your equation to estimate the wolf population in 2016: 44.9
- d. Use your equation to estimate the wolf population in 2024: 16.42

4) Compare the tables and relationship for questions 2 and 3. What might cause this trend?

Vary

5) The following table shows the value of Sharon's car after purchase:

Year Since Purchase	0	1	2	3	4	5
Value	\$16,000	\$14,400	\$12,960	\$11,664	\$10,497.60	\$9,447.84

a. What type of regression model would best fit this data? Exponential

b. Write the equation for the best regression:  $16000(0.9)^x$

c. Use your equation to estimate the worth after 4 more years: 6198.73

7) The following table logs the annual reports for gross income of a company as they implement new methods for processing and shipping orders, in millions (use years since 2000):

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Income	2.8	3.2	3.35	3.1	3	3.05	3.35	3.5	3.4	3.15

a. What type of regression model would best fit this data? Quartic

b. Write the equation for the best regression:  $-0.004x^4 + 0.07x^3 - 0.39x^2 + 0.76x + 2.8$

c. Use your equation to estimate the income in 2010: 41.4      1.4

$x = 10$

8) Use a power regression to calculate a model for the following data:

X	1	2	4	5	7
Y	3.2	11.143	38.8	58	106.25


a. Write the power regression equation:

$3.2x^{1.8}$

b. Use the equation to estimate the value for y if x = 8:

135.12

6) Billy's parents have been mark his height on the wall since he was 4:

Age	4	5	6	7	8		10	11	12
Height	32"	36"	39"	42"	45"		53"	57"	60"

a. What type of regression model would best fit this data?

Linear

b. Write the equation for the best regression:

$3.51x+17.88$

c. Use your equation to estimate Billy's height at age 3:

28.41

d. Use your equation to estimate Billy's height at age 9:

49.47

e. Use your equation to estimate Billy's height at age 14:

67.02

f. Use your equation to estimate Billy's height at age 21:

91.59

g. Which estimate is most reliable?

9

Least?

21



# QUIZ

Round to 2 places

## Unit 6: Statistics

# Univariate Data

Regression Lines

**Measures of Central Tendency:: indicate the general trend of a set of data.**

**Mean (average)::**  $\frac{\text{Sum}}{\text{how many}}$  **4**

**Median (middle)::** *\*When in Order*  $\frac{3+4}{2}$  **3.5**

**Mode (most)::** *Repeated* **3 and 5**

**Data set::** {1, 2, 3, 3, 4, 5, 5, 9}

**Measures of Spread - indicate how varied the set of data is**

**Range - Difference between greatest and least values**  $\text{max} - \text{min}$

**Interquartile Range (IQR) - Difference between 3rd and 1st quartile**  $Q_3 - Q_1 =$

**Standard Deviation - a measure based off of the mean (we will find on the calculator)**

# **OUTLIERS**

**Values that are substantially different from the rest of the data set (high or low).**

**Sometimes outliers are important pieces of data but other times they are misleading.**

**Outliers have a greater effect on the mean than other measures of center.**

**An outlier is 1.5 IQRs below Q1 or above Q3**

56 61 68 73 79 83 86 86 91 94 ~~96~~  
96

Mean -  $\bar{x}$  79.36      Range -  $\text{max} - \text{min}$   
Median - Med 83      IQR -  $Q_3 - Q_1$   
Mode - 86      SD -  $\sigma_x$   
12.72

Outlier?