Wednesday 1/29

Simplify the following expressions.

1. $\dfrac{(6s^{-8}t^{3})^{3}}{(s^{4}t^{-7})^{2}}$

$$\frac{6^{3}s^{-24}t^{9}}{s^{8}t^{-14}}$$

$$\frac{216t^{9}t^{14}}{s^{8}s^{24}}$$

$$\boxed{\frac{216t^{23}}{s^{32}}}$$

2. $\dfrac{(n^{4}p^{3})^{3}}{(n^{5}p^{-1})^{3}}$

$$\frac{n^{12}p^{9}}{n^{15}p^{-3}}$$

$$\frac{n^{12}p^{9}p^{3}}{n^{15}}$$

$$\frac{n^{12}p^{12}}{n^{15}}$$

$$n^{12-15}p^{12} = n^{-3}p^{12}$$

$$= \boxed{\frac{p^{12}}{n^{3}}}$$

Regression

Linear vs. Exponential

Steps for Linear Regression

- List and Spreadsheets
- Type values x and y
- Menu
  - ↳ Statistics
    - ↳ Stat Calculations
      - ↳ Linear Regression(mx+b)
        - ↳ a[ ], b[ ]
          - ↳ enter (2x)

Steps for Exponential Regression

- List and Spreadsheets
- Type values x and y
- Menu
  - ↳ Statistics
    - ↳ Stat Calculations
      - ↳ A. Exponential Reg. $(a \cdot b^x)$
        - ↳ a[ ], b[ ]
          - ↳ enter (2x)

1. Students in Ms. Garth's Algebra II class wanted to see if there are correlations between test scores and time spent watching television. The students created a table in which they recorded 13 student's average number of hours per week spent watching television and scores on a test. Use the actual data collected by the students in Ms. Garth's class, as shown in the table below, to answer the following questions.

X	**TV hrs/week (average)**	30	12	30	20	10	20	15	12	15	11	16	20	19
Y	**Test Scores**	60	80	65	85	100	78	75	95	75	90	90	80	75

mx+b

a) Find the best fitting linear model that represents the data and the correlations coefficient.

$y = -1.43x + 105.98$ $r = -0.82$

b) Identify the y-intercept. What does it represent in the context of the problem?

105.98 test score for Ø hours of t.v.

c) Using this model, what is the estimated test score of a student who watches TV for 25 hours?

$x = 25$ $y = -1.43(25) + 105.98$ $\boxed{70}$

d) Using this model, what is the highest number of hours a student can watch TV and still pass the test (make a 70)?

25 hours

2. The town planners designed a town for an optimal growth of 8% per year. Below is a table representing the growth (in thousands) from 1997 to 2003.

X	Year	Population
0	1997	50
1	1998	54
2	1999	58
3	2000	63
4	2001	68
5	2002	73.5
6	2003	79.3

$a \cdot b^x$

a) Find the best fitting exponential model that represents the data and the correlation coefficient.

$y = 49.94(1.08)^x$ $r = 0.99$

b) Using this model, what is the predicted population in the year 2017?

$X=20$ $y = 49.94(1.08)^{20}$ 232.77 thousands

c) Using this model, what was the estimated population in 1977?

$X=-20$ $y = 49.94(1.08)^{-20}$ 10.71 thousands

d) In what year will the population double?

$X=10$ $y=49.94(1.08)^{10}$ 107.82

$X=9$ $y=49.94(1.08)^{9}$ 99.83

$\boxed{\text{10 years}}$ $\boxed{2007}$

3. A rapidly growing bacterium has been discovered. The data in the following chart represents the number of bacteria in a sample each hour.

Hours	Bacteria Present
0	20
1	40
2	75
3	150
4	297
5	510

a) Write the linear model that represents the data and the correlation coefficient.

b) Write the exponential model that represents the data and the correlation coefficient.

c) Which model is the best fitting model? Explain.

d) Using the best fitting model, how much bacteria is present after 10 hours?

e) Using the best fitting model, how much bacteria is present after one day?

4. Use the following data table to construct a regression model, and then answer the questions.

Shoe Length (inches)	Height (inches)
11.4	68
11.6	67
11.8	65
11.8	71
12.2	69
12.2	69
12.2	71
12.6	72
12.6	74
12.8	70

a. What is the best regression model for the data?

b. Based on your regression model, what height would you expect a person with a shoe length of 13.4 inches to be?

c. Interpret the value of your correlation coefficient in the context of the problem.