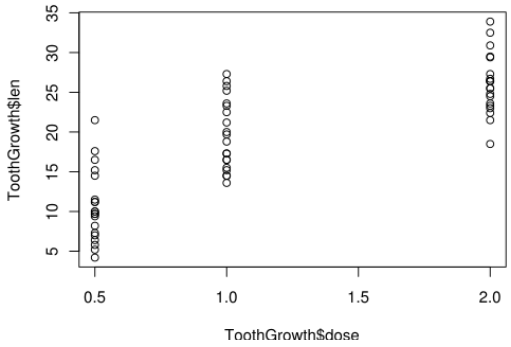
Shepherd UNIVERSITY

Math 314
Statistics

Regression Review Exercises

1. The length of odontoblasts (tooth cells) in each of 10 guinea pigs at each of three dose levels of vitamin C (0.5, 1, and 2 mg) is measured. The scatter plot of the data is shown below.



The equation for the regression line computed from the data is

$$y \approx 10\,x + 7$$

where x is dose level in mg and y is odontoblast length. The correlation coefficient for the data is $r \approx 0.8$.

a) Sketch the regression line in the above plot.

b) Estimate the odontoblast length if the dose level is 1.5 mg.

c) The RMS error for the regression line is 4.5. Among guinea pigs that receive a vitamin C dose level of 1 mg, 68% have odontoblast length in what range?

d) One measurement has dose = 2.0 mg and length = 23.0. Calculate the length predicted by the regression line then calculate the error (residual) for that value.

2. For men age 25–34, the relationship between education (years of schooling completed) and systolic blood pressure can be summarized as follows.

average education $\approx$ 13 years,	SD $\approx$ 3 years
average blood pressure $\approx$ 119 mm	SD $\approx$ 12 mm

The correlation coefficient is $r \approx -0.1$.

a) Sketch the regression curve and the SD curve. Write down the equations for both curves.

b) Predict the blood pressure of a man with 20 years of education.

c) One subject had 20 years of education, and his blood pressure was 118 mm. True or false and explain: compared to other men at his educational level, his blood pressure was a bit on the high side.

d) Suggest reasons for the sign and magnitude of r.