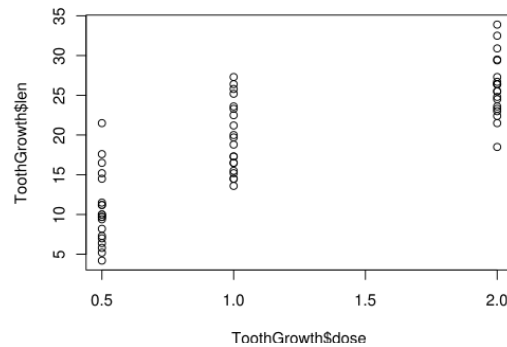




## Quiz: Regression

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

$$y \approx 10x + 7$$

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

- Sketch the regression line in the above plot.
- Estimate the odontoblast length if the dose level is 1.5 mg.
- The RMS error for the regression line is 4.5. Among guinea pigs that receive a vitamin C dose level of 2 mg, 68% have odontoblast length in what range?
- Among guinea pigs that receive a vitamin C dose level of 1.5 mg, 95% have odontoblast length in what range?
- One measurement has dose = 1.0 mg and length = 14.0. Calculate the length predicted by the regression line then calculate the residual error for that value:  $y - (\text{predicted value})$ .

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  $r \approx -0.1$ .

- Sketch the regression line and write down its equation.
- Predict the blood pressure of a man with 20 years of education.
- Estimate the average blood pressure among all subjects with 20 years of education.
- 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.
- Suggest reasons for the sign ( $\pm 1$ ) and magnitude (0.1) of  $r$ .