Things you should know for the second exam.

Sample mean, \( x \): \( \bar{x} = \frac{\sum x}{n} \), Sample standard deviation, \( x \): \( s_x = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} \)

Sample mean, \( y \): \( \bar{y} = \frac{\sum y}{n} \), Sample standard deviation, \( y \): \( s_y = \sqrt{\frac{\sum (y - \bar{y})^2}{n-1}} \)

Sample correlation coefficient: \( r = \frac{\sum(x - \bar{x})(y - \bar{y})}{(n-1)s_x s_y} \)

Least squares regression line, e.g. line of best fit

estimated slope: \( b_1 = r \frac{s_y}{s_x} \)

estimated \( y \)-intercept: \( b_0 = \bar{y} - b_1 \bar{x} \)

equation: \( \hat{y} = b_0 + b_1 x \)

\( R^2 = (r)^2 = (\text{correlation coefficient})^2 \)

residual = \( y - \hat{y} \)

Know how to interpret slope, \( y \)-intercept and \( R^2 \) within the context of the problem.

Know what a plot of residuals versus the explanatory variable tells you about the fit of the least squares regression line.

Know the goals of re-expression of data. Know how the ladder of powers works.

Know the different methods for obtaining a sample. Know which are biased and which are not. Know how to randomly select a sample.

Be able to comment on control of outside variables, randomization, replication within an experiment, and blocking as they relate to experiments. Also be familiar with the ideas of a control group, placebos, blind and double blind and how to construct a diagram to illustrate how an experiment will be conducted.