Regression

Galton (1870)

Graves (1880)

A. Best fit line
B. Predictive line
C. How far off
D. Best in what

Slope line

Simple linear regression

Exact 95% CI

Test: L = 110 - 11.244

I Week later

Take home final handed out

Fridays 9:30 in class

Homework 4 due 11/9

I am canceling homework grades.

Due: L - 244

AMG2

31 May
slope of regression line

\[ \hat{\beta}_1 = r \cdot \frac{s_y}{s_x} \]

**Equation (1)**

**p. 25**

equation of regression line

\[ y = \hat{\beta}_0 + \hat{\beta}_1 x \]

predicted y value

y-intercept

reg. line goes through \((x_1, y_1)\)

\[ \hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x \]

so

\[ \hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x} \]

**Equation (2)**

**p. 25**

regression to the mean
best line
Solve for $(\hat{\beta}_0, \hat{\beta}_1)$

**To minimize**
\[
\frac{1}{n} \sum_{i=1}^{n} \left[ y_i - (\hat{\beta}_0 + \hat{\beta}_1 x_i) \right]^2
\]

This problem:
\[
\begin{pmatrix}
y_1 \\
x_1 \\
y_2 \\
x_2 \\
\vdots \\
y_n \\
x_n
\end{pmatrix}
\]

Least squares over lines

**Fact**

Regression = line

Gauss

Laplace

\[ y = \beta_0 + \beta_1 x \]
95% CI for \( \theta \):

\[
\begin{array}{c}
0 \\
0.46 \\
0.77 \\
1.08 \\
\end{array}
\]

The lick between 0.77 & 0 is statistically significant.