AMS 5 Wed

Regression

H/W #6 due Mon @ final review (4-6 @ Media theater)

C.S. #18 (Regression) *pg. 116*

The line that smooths out the graph of ave's is called the regression line & it's slope is \( r \cdot \frac{sy}{sx} \) (slope of best line) for predicting \( Y \) from \( X \).

Equation for regression line

\[
\text{predicted } Y \text{ value} = \text{ intercept } + (\text{slope} \cdot X \text{ value})
\]

\[
\hat{y} = \hat{a} + \hat{b} \cdot x
\]

2 ways to make a regression prediction:

1) This guy is 70\(\frac{1}{2}\) in. tall = \(70\frac{1}{2} - 68 = +1\) in su. \(\Rightarrow\) he is 2.5 SD above ave. in height \(\Rightarrow\) we predict he will only be 1.1 SDs above ave. in weight = (0.30)(1) = 0.30 SDs above ave in weight = (0.30)(25 lbs) = 9 lbs. above ave. \(\Rightarrow\) 158 lbs. + 9 lbs. = 167 lbs.

2) Work out slope or intercept of reg. line, plug in the \( x \) & see what \( Y \) value results.

\[
\text{reg. line has slope } r \cdot \frac{sy}{sx} = \hat{b}
\]

\[
\hat{y} = \hat{a} + \hat{b} \cdot x
\]

\(\overline{x} = 80 \quad \hat{a} = 4 - \hat{b} \cdot x\)
A. Give or take how much?

Ignore $x$, predict $y$: $\hat{y} = \bar{y}$, give or take $\pm s_y$

Use $x$, predict $y$: $\hat{y} = \hat{a} + \hat{b}x$; give or take should be smaller than by: $SE(\hat{y}) = s_y \sqrt{1-r^2}$

If correlation is 0 then $r$ doesn't matter & uncertainty is $s_y$