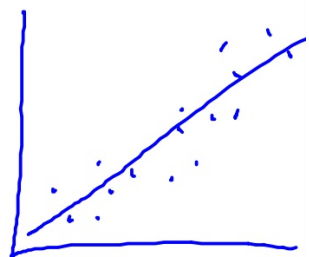


9.3: Linear Regression (line of best fit)

REGRESSION EQUATION

- The equation of the straight line that represents the relationship is the regression equation.
- The straight line thru the data is the regression line.
- Regress -tend to revert to more typical
- Also called the line of best fit or the least squares line



REGRESSION EQUATION

- X is the independent variable (it's the one you used to pick in algebra) or predictor variable or explanatory variable
- Y is the dependent variable or response variable
- Same idea as $y=mx+b$ where b_0 = y-intercept and b_1 = slope

$$\hat{y} = mx + b$$

ROUNDING RULE

- Round b_0 and b_1 to three sig digits at the end of the calculation
- The book might round differently so your answer might be slightly off

FIND THE EQ OF THE REGRESSION LINE

● X: 1 2 2 5 6

● Y: 2 5 4 15 15

$$\hat{y} = 2.862x - .957$$

$$|r| > r_{cv} \leftarrow p.742$$

$$|.985| > .878 \checkmark$$

Sign. linear corr.

USING THE REGRESSION EQ TO MAKE PREDICTIONS

- Can only be done if r indicates there is a linear correlation
- If there is a linear correlation, the best predicted y -value is found by plugging the given x -value into the linear regression eq and solving for y
- If there isn't a linear correlation, the best predicted y -value is \bar{y} (the sample mean of y)
mean (L_2)

IN EACH CASE, FIND THE BEST PREDICTED VALUE OF Y GIVEN THAT X=2.00

① $r = -.123$, $\bar{y} = 8$, $n = 30$ and the equation of the regression line is $\hat{y} = 7 - 2x$

② $r = -.567$, $\bar{y} = 8$, $n = 30$ and the equation of the regression line is $\hat{y} = 7 - 2x$

① $|-.123| \geq .361$

No,

$$\boxed{\bar{y} = 8}$$

② $|-.567| \geq .361$ ✓

Yes

$$\hat{y} = 7 - 2(2) = 3$$

p. 528

⑧ $\hat{y} = .0677x - 1.13$

$r = .517$

$r_{cv} = .602$

predict y
when $x = 80$

$\bar{y} = 3.04$

$|.517| \stackrel{?}{>} .602$
No

Since the line does not have significant linear correlation, the mean of the y 's would be the prediction

$$\textcircled{14} \quad \hat{y} = 5.34x + 22.5$$

$$r = .828$$

$$|.828| > .532 \checkmark$$

$$r_{cv} = .532$$

predict y
when $x = 4$ ft.

$$\hat{y} = 5.34(4) + 22.5 = 43.8$$