STT 200 5:30 4-21-10

L.S. AND (NORMAL) REG
2D NORMAL LINE

A. L.S. PREDICTED AT GIVEN X
B. ALSO (2D NORMAL) T.A.F. AVE Y AT THAT X

SHEET 4-21-10
x = chirps/sec (?); y = air temp

x  20  89
y  14  76

x = 16.6

NORMAL PROBABILITY
(PLOT OF RESIDUALS)
(~ LINE IF NORMAL DISTRIBUTED)
Regressions

\[ y = \beta_0 + \beta_1 x + \epsilon \]

\[ b_1 = \frac{\sum (x \cdot y) - n \cdot \bar{x} \cdot \bar{y}}{\sum x^2 - n \cdot \bar{x}^2} = 0.82 \]

\[ b_1 = \frac{\sum y}{\sum x} = \frac{6.71}{1.72} = 3.91 \]

If \( H_0: \beta_1 = 0 \)

\[ y_i = \beta_0 + \beta_1 x_i + \epsilon_i \sim \text{N}(0, \sigma^2) \]

Model!!

\[ \text{Then } \sigma^2 \text{ is the residual sum of squares} \]

\[ \text{Resid} = \frac{\sum (y_i - \hat{y})^2}{n - 2} \]

\[ b_1 = \frac{\sum (x \cdot y) - n \cdot \bar{x} \cdot \bar{y}}{\sum x^2 - n \cdot \bar{x}^2} = 0.82 \]

\[ b_1 = \frac{\sum y}{\sum x} = \frac{6.71}{1.72} = 3.91 \]
\[
\text{SE}(b_1) \quad \text{IF NORMAL} = \frac{\sqrt{\text{Mean Square Error}}}{\sqrt{n-2}} \quad b_1 = 0.61...
\]

95\% CI \quad n > 2

\[
b_1 \pm t_{n-2, 0.025} \cdot \text{SE}(b_1)
\]

\[
3.21635 \pm 2.16 \cdot 0.610236 = \{1.89834, 4.53436\}
\]

3.R SHEED. page up per minute (ppm)

\[
\text{Cost (ppm/page)}
\]

UNIT = PRINTER (ALL DIFF MODELS)

Y:

Sample almost flat

\[
X
\]

predict per page cost at ppm 4.5

Seems output is poor predictor of cost per page.

Region plot
Normal Probability

Plot - textbook

NORML ST ORY

1. You (formally) Find \( b_1 \) FROM REGRESSION

2. \( \hat{x}, \hat{y}, \hat{a}_b, \hat{b}, \hat{n}, \hat{n} \)

3. CHECK AGREEMENT \( t_{max} \)

4. EVALUATE \( SE(b_1) = \frac{\sqrt{1-x^2}}{2n-2} \ h_1 \)

5. \( 95\% \text{ CI} \)

6. \( 2.101 \)

7. IN FIRST PICTURE (LS PLOT OF DATA)

8. SKETCH IN

9. \( \frac{\sqrt{1-x^2}}{2} \)

10. \( SD(x) \) \( y \)

11. \( x = \frac{1}{2} S \)

12. \( \text{COMMENT ON THE SUITABILITY OF "NORMAL MODEL"!} \)

13. \( \frac{\bar{x}}{\bar{y}} \rightarrow \frac{LS \ flat}{\text{Your Case}} \)
Little League Baseball Pitchers:
Each tosses 50 pitches.
Record $x = \#\text{strikes before}$
$y = \#\text{strikes in 50}$

- Video
- Residual Plot

Normal proxy
Plot - casually examined
Looks like what 2D normal might produce.