AP Statistics Chapter 12: More about Regression

12.1 – Inference for Linear Regression

Sample Computer Output for a Linear Data Analysis

Predictor	Coef	SE Coef	T	P
Constant	7.0647	0.2672	26.44	0.000
Years since 1970	0.36583	0.01048	34.91	0.000

S = 0.544467   R-Sq = 98.9%   R-Sq(adj) = 98.8%

- For the above, the linear equation is y = 7.0647 + 0.36583x
- The Standard Error of the slope (SE_b) = 0.01048
- S = the Standard Deviation of the Residuals. Since S = 0.544, predictions of y from x based on this regression model will be off by an average of about 0.544.

Confidence Interval for the Slope of a Regression Line

The confidence interval for *β* has the familiar form

statistic ± (critical value) · (standard deviation of statistic)

The *t* Interval for the slope β: $b \pm t^{*} SE_b$

Where *b* is the slope, SE_b is the standard error of the slope, and *t* is the critical value with df = n – 2.

Performing a Significance Test for the Slope

H_o: $\beta = \beta_0$ (some hypothesized value – often 0)
H_a: either $\beta < \beta_0$ or $\beta > \beta_0$ or $\beta \neq \beta_0$

Test Statistic: $t = \frac{b - \beta_0}{SE_b}$ **P-Value**: Use the *t* distribution with df = *n* - 2

12.2 – Transformations to Achieve Linearity

Finding an Exponential Model for Data	Finding a Power Model for Data
Form: $y = A(B)^x$	**Form: $y = A(x)^B$**
Transformation: (x, log y)	**Transformation: (log x, log y)**
Process:	**Process:**
1. LinReg(x, log y)	**1. LinReg(log x, log y)**
2. Resulting line is y = a + bx	**2. Resulting line is y = a + bx**
3. Let A = 10^a and B = 10^b	**3. Let A = 10^a and B = b**