April 29, 2013

Last New Topic....

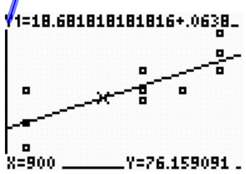
Inference for Regression (Slope)

$\hat{y} = a + bx$ (1b)

$\widehat{price} = 18.68 + .0639(\text{power})$

As power increases by 1 watt, we expect price to increase by \$.06, on average.

(3a)



\$76.16 - predicted price for 900 W microwave.

(3b) prediction range: (700, 1200) - power

Be careful of extrapolation!

L1	L2	L3 3
1100	80	-8.932
700	80	16.614
700	50	-13.39
1200	90	-5.318
1200	100	4.6818
1200	90	-5.318
1200	110	14.682

L3(1)= -8.93181818...

residual

observed − predicted

$$y - \hat{y}$$

\+ residual → low prediction

− residual → high prediction

(4b)

SS resid (1-var stats)

$$\Sigma x^2 = 948.16$$

1-Var Stats
$\bar{x}$=8.545455E-12
Σx=9.4E-11
Σx^2=948.159091
Sx=9.737346101
σx=9.284195226
↓n=11

5) $$S_e = \sqrt{\frac{\Sigma x^2}{n-2}} = \sqrt{\frac{948.16}{9}} = \$10.26$$

→ std. dev. of residuals (error)

$r^2 = .65$ (65% of variation in price can be explained by its linear relationship with power.)

$S_e = \$10.26$

This is a fairly good model for predicting price from power. Our predictions would vary by only $10.26, on average.

Example continued

Minitab output looks like

Regression Analysis: % Fat y versus Age (x)

Estimated y intercept a

The regression equation is

% Fat y = 3.22 + 0.548 Age (x)

Regression line

Estimated slope b

Predictor	Coef	SE Coef	T	P
Constant	3.221	5.076	0.63	0.535
Age (x)	0.5480	0.1056	5.19	0.000

y-int

slope

S = 5.754 R-Sq = 62.7% ~~R-Sq(adj) = 60.4%~~

Analysis of Variance

residual df = n -2

Source	DF	SS	MS	F	P
Regression	1	891.87	891.87	26.94	0.000
Residual Error	16	529.66	33.10		
Total	17	1421.54			

SSTo

SSResid

s_e^2

33

$$Y = \alpha + \beta x + e \quad \text{(Population)}$$

Ho: There is no linear relationship between body temp. & heart rate.

$$\left(r = 0 \rightarrow b = r\frac{S_y}{S_x} = 0\right)$$

$$\boxed{H_0: \beta = 0}$$

$H_a: \beta \neq 0$

$\alpha = .05$