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STA 3032
Section 7370
Quiz #5
Spring, 2009

1. Permeability (x) and electrical resistance (y) were measured in 12 samples of human skin:

Sample	1	2	3	4	5	6	7	8	9	10	11	12
x	1.08	1.79	1.54	2.04	1.51	1.16	1.71	1.64	1.67	1.19	1.56	1.63
y	1.35	0.40	0.80	0.17	0.94	1.13	0.57	0.65	0.62	1.22	0.78	0.64

Summary statistics are:

$\bar{x} = 1.54$ $\bar{y} = 0.77$

$S_{xx} = \sum (x - \bar{x})^2 = 0.86$ $S_{yy} = \sum (y - \bar{y})^2 = 1.29$

$S_{xy} = \sum (x - \bar{x})(y - \bar{y}) = -1.04$

The equation for the least squares line is $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x = 2.64 - 1.21x$, and the coefficient of determination is R^2=.97.

a. (5) Compute SS Regression and SS Error:

SS Reg = R^2(SST) = .97(1.29) = 1.25 SS Error = SST – SSR = 1.29 – 1.25 = 0.04

c. (10) Permeability (x) of a sample of skin was measured to be x=1.74, but resistance (y) was not measured for the sample of skin. Construct a 95% prediction interval for the value of y.

$\hat{y} = 2.64 - 1.21(1.74) = -0.535$

95% PI: $\hat{y} \pm t_{.025,dfE} \sqrt{1 + \frac{1}{n} + \frac{(x - \bar{x})^2}{S_{xx}}} = -0.535 \pm 2.23 \sqrt{1 + \frac{1}{12} + \frac{(1.74 - 1.54)^2}{0.86}}$

d. (10) Construct a 95% confidence interval for the mean resistance of the sub-population of **all** conceivable samples with permeability equal to 1.74:

$\hat{y} = 2.64 - 1.21(1.74) = -0.535$

95% PI: $\hat{y} \pm t_{.025,dfE} \sqrt{\frac{1}{n} + \frac{(x - \bar{x})^2}{S_{xx}}} = -0.535 \pm 2.23 \sqrt{\frac{1}{12} + \frac{(1.74 - 1.54)^2}{0.86}}$