

Exercise

Find a prediction interval data listed below.

| | | | | | | |
|---------------|------|------|------|------|------|------|
| Cost of Pizza | 0.15 | 0.35 | 1.00 | 1.25 | 1.75 | 2.00 |
| Subway Fare | 0.15 | 0.35 | 1.00 | 1.35 | 1.50 | 2.00 |

Using: *Cost of a slice of pizza*: \$0.75; 99% confidence

Solution

The predicted values (from Excel):

| | <i>Coefficients</i> |
|--------------|---------------------|
| Intercept | 0.03456017 |
| X Variable 1 | 0.94502138 |

$$\hat{y} = 0.034560 + 0.945021x$$

$$\begin{aligned}\hat{y}|_{0.75} &= 0.034560 + 0.945021(0.75) \\ &= 0.743\end{aligned}$$

$$\alpha = 0.01 \quad \text{and} \quad df = n - 2 = 4$$

$$t_{\alpha/2} = t_{0.005} = 4.604$$

| TABLE A-3 | | t Distribution: Critical t Values | | | | |
|--------------------|--|-----------------------------------|-------|---------------------------|-------|-------|
| Degrees of Freedom | | 0.005 | 0.01 | Area in One Tail 0.025 | 0.05 | 0.10 |
| | | 0.01 | 0.02 | Area in Two Tails 0.05 | 0.10 | 0.20 |
| 4 | | 4.604 | 3.747 | 2.776 | 2.132 | 1.533 |

$$\begin{aligned}E &= t_{\alpha/2} s_e \sqrt{1 + \frac{1}{n} + \frac{n(x_0 - \bar{x})^2}{n(\sum x^2) - (\sum x)^2}} \\ &= (4.604)(0.122987) \sqrt{1 + \frac{1}{6} + \frac{6(0.75 - 1.083333)^2}{6(9.77) - (6.5)^2}} \\ &\approx 0.622\end{aligned}$$

$$\hat{y} - E < y < \hat{y} + E$$

$$0.743 - 0.622 < y_{0.75} < 0.743 + 0.622$$

$$\underline{\$0.12 < y_{0.75} < \$1.37}$$