

Practice Problems

Problem 11.8:

Rathbun (1988) reported on experiments in surveying manatees along Florida's Crystal and Indian Rivers by observation from airplanes and helicopters. He initially suspected that helicopters, due to their slower speed, would provide higher and more accurate counts. Helicopter counts were intended to provide a "truth" count for judging the airplane counts. Data failed to support this expectation, however, partly because helicopters frighten manatees. Rathbun concluded that "there is no significant advantage" in using helicopters, which are much more expensive.

| Day | Manatee Count | |
|-----|---------------|-----------------|
| | From Airplane | From Helicopter |
| 1 | 24 | 30 |
| 2 | 31 | 30 |
| 3 | 32 | 33 |
| 4 | 39 | 38 |
| 5 | 47 | 58 |
| 6 | 47 | 58 |
| 7 | 35 | 48 |
| 8 | 76 | 75 |
| 9 | 95 | 85 |
| 10 | 85 | 55 |

SAS Printout:

Model: MODEL1
Dependent Variable: Y
Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Value | Prob>F |
|----------|----------|----------------|-------------|---------|--------|
| Model | 1 | 2439.60365 | 2439.60365 | 24.692 | 0.0011 |
| Error | 8 | 790.39635 | 98.79954 | | |
| C Total | 9 | 3230.00000 | | | |
| | | | | | |
| Root MSE | 9.93980 | R-square | 0.7553 | | |
| Dep Mean | 51.00000 | Adj R-sq | 0.7247 | | |
| C.V. | 19.48980 | | | | |

Parameter Estimates

| Variable | Parameter Estimate | Standard Error | T for H0: Parameter=0 | Prob > T |
|----------|--------------------|----------------|-----------------------|-----------|
| INTERCEP | 17.388852 | 7.45862853 | 2.331 | 0.0481 |
| X | 0.657752 | 0.13236717 | 4.969 | 0.0011 |

- (a) Given that $SS_{xx} = 5638.9$ and $\bar{x} = 51.1$. Find the 99% confidence interval of \hat{y} at $x = 50$.
- (b) Find the 95% prediction interval of y at $x = 50$.

Problem 11.9:

Given that $SS_{xx} = 47.6$, $SS_{yy} = 168.1$, $\bar{x} = 1.2$, $SS_{xy} = 85.6$, $\hat{y} = -2.458 + 1.7983x$, and $n = 10$.

- (a) Find the 95% confidence interval to estimate the mean value of y at $x = 5$.
- (b) Find the 95% confidence interval to estimate the mean value of y at $x = 1.2$.