

EEB 581, Problem Set Six

Due Tuesday, 7 March 2006

1 : Consider the following linear models

- (a) For $y = \mu + \beta_1 x_1 + \beta_2 x_2 + e$, what is the expected change in y given a one unit change in x_1 ?
- (b) For $y = \mu + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 \cdot x_2 + e$, what is the expected change in y given a one unit change in x_1 ?
- (c) For the model in (b), what is the expected change given a one unit change in x_2 ?

2 : Consider quadratic regression forced through the origin, $y_i = \beta_1 x_i + \beta_2 x_i^2 + e$.

- (a) For n observations, write this in matrix form.
- (b) What is the OLS estimator for β_1 and β_2 .
- (c) What is the variance-covariance matrix for these estimates?

3 : Suppose you have the following data for 50 observations

$$\sum_i x_i^2 = 300, \quad \sum_i x_i^3 = 100, \quad \sum_i x_i^4 = 12000, \quad \sum_i x_i y_i = -200, \quad \sum_i x_i^2 y_i = 600$$

- (a) Compute the OLS estimate of β_1 and β_2 .
- (b) Suppose $\sum (y_i - \hat{y}_i)^2 = 400$. Estimate σ_e^2
- (c) Compute $\sigma^2(\hat{\beta}_1)$.
- (d) Compute $\sigma^2(\hat{\beta}_2)$.
- (e) Compute $\sigma(\hat{\beta}_1, \hat{\beta}_2)$