

EEB 596z, Problem Set One

Due Tuesday 17 January 2002

1 : Data was measured on 50 individuals for arm size (x) and brain size (y), with the following results:

$$\bar{x} = 10, \quad \bar{y} = 50, \quad \sum_{i=1}^{50} (x_i - \bar{x})^2 = 100, \quad \sum_{i=1}^{50} (y_i - \bar{y})^2 = 400, \quad \sum_{i=1}^{50} (x_i - \bar{x})(y_i - \bar{y}) = 175$$

- (a) Compute the variances of x and y , their covariance, and their correlation.
 - (b) What the best linear regression of arm size on brain size?
 - (c) What the best linear regression of brain size on arm size?
 - (d) What fraction of the total variance in brain size does the regression account for?
 - (e) Assuming the appropriate normality assumptions, compute the 95% confidence intervals for σ_x^2 and σ_y^2 . (Use R to obtain the approximate χ^2 values).
- 2 : Use the properties of covariances to show that $E[(x - \mu_x)^2] = E[x^2] - \mu_x^2$.
- 3 : What is the covariance between a particular data point (x_i) and the sample mean \bar{x} ?