

EEB 581, Problem Set One

Due Thursday, 24 Jan 2006

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

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

- (a) Compute the variances of x and y , their covariance, and correlation.
- (b) What is the best linear regression of arm size on brain size?
- (c) What is 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?

2: What is the covariance between a particular data point z_i and the sample mean $\bar{z} = (1/n) \sum z_i$? Assume the data points are independent. *Hint:* This is just $\text{Cov}(z_i, \bar{z}) = \text{Cov}(z_i, \frac{1}{n} \sum_j z_j)$, Now just use the rules of covariances.