

## Homework #8 (Correlation Analysis)

MAR 599  
Spring 2009

1. Prove that  $\hat{\sigma}_y^2 = \hat{\rho}_{xy}^2 \hat{\sigma}_y^2$ .
2. Write your own versions of 'cov' and 'corrcoef' and confirm that they return the same results as Matlab's versions.
3. For each of the four data sets in the file 'corr\_data.mat' do the following:
  - (a) Plot the data.
  - (b) Describe the data in words.
  - (c) Compute the correlation coefficient.
  - (d) Use Fisher's  $z$ -transform to compute the confidence limits on the correlation coefficient.
  - (e) Use the one- and two-sided  $t$ -tests to determine if the correlation coefficient is greater than/less than/different from zero.
  - (f) Plot the best fit lines  $\hat{y}_i(x_i)$  and  $\hat{x}_i(y_i)$
  - (g) Plot the standardized residuals.
  - (h) Write whether or not linear correlation analysis was appropriate for the data.
4. Log-transform the data in 'data{3}' and repeat the steps in Problem 3.
5. Calculate Spearman's rank correlation for the data in sets 3 and 4.