

D. R. Brillinger

2003 Statistics 215a Exam

Answer both questions. Please answer in the space provided. No notes, books or calculators may be used.

PLEASE, NO QUESTIONS TO THE PROCTOR. MAKE AN INTERPRETATION, INDICATE IT AND PROCEED.

1. In the lectures a variety of ideas, concepts and methods of exploratory data analysis have been presented. These include: Q-Q plot, spread-versus-level plot, Box-Cox transformation, robust/resistance, interaction plot, median polish, overlay, phase portrait.

For three of these define, explain, and indicate uses and examples. Do not be overly brief in your answers.

2. Ordinary least squares.

a) What happens to a fitted value \hat{y} when the x 's are rescaled, that is the $x_{ij} = k_j w_{ij}$? Discuss the result.

b) Set down the formula for the least squares approximation of an m -vector y by an m by p matrix of explanatories x . Suppose that an n -vector Y of y 's and corresponding n by p matrix X of x 's later become available. Develop a formula indicating how the coefficients of the explanatories change with the inclusion of the new data. Discuss the result obtained.

c) Suppose that two r by c arrays $\{y_{ij}\}$ and $\{Y_{ij}\}$ are available. How does the result of fitting $\{y_{ij}+Y_{ij}\}$ by means relate to the corresponding results for fitting $\{y_{ij}\}$ and $\{Y_{ij}\}$. Discuss the result.