

Jean-Marie Dufour
April 15, 2008

**ECONOMETRICS
REVIEW QUESTIONS
Analysis of residuals in linear regression**

1. Answer by TRUE, FALSE or UNCERTAIN to each one of the following statements, and justify briefly your answers (maximum: 1 page per statement).
 - (a) In the classical linear model, disturbances (errors) are homoskedastic but least squares residuals are not homoskedastic.
 - (b) In the classical linear model, disturbances (errors) are uncorrelated but least squares residuals are correlated.
 - (c) In the classical linear model, it is possible to transform least squares residuals to make them homoskedastic.
 - (d) If the minimum sum of squares of a linear regression is zero, outliers become immediately visible.
 - (e) By Studentizing least squares residuals, outliers are eliminated.
 - (f) The Goldfeld-Quandt test is a test meant to detect outliers.
 - (g) The Durbin-Watson test is a test meant to detect heteroskedastic errors.
 - (h) The Goldfeld-Quandt test assumes that errors in a linear regression follow a Gaussian distribution.

2. Consider the linear regression

$$y = X\beta + \varepsilon, \quad \varepsilon \sim N[0, \sigma^2 I_T] \quad (0.1)$$

where X is a fixed $T \times k$ matrix. Describe how the following assumptions could be tested

- (a) there is no outlier;
- (b) the disturbances are homoskedastic;
- (c) there is no serial dependence among the disturbances.