ECONOMETRIC TIME SERIES

(University of Iceland, Spring -05/M.Linden)

1. Give a short explanation of the following concepts: (12 points)

   (a) Trend stationary
   (b) Error correction model
   (c) ARIMA-process
   (d) VAR-model
   (e) Spurious regression
   (f) Common stochastic trends

2. Describe and explain the Dickey-Fuller tests. (6 points)

3. (a) For the process $\{Y_t\}_1^T$ the autocorrelation function $ACF(k)$ takes values with lags $k = 1 : \rho_1 \neq 0$, and $k > 1 : \rho_k = 0$, and the partial autocorrelation $PACF(k)$ takes values $\phi_k \neq 0$, $k = 1, 2, 3, 4, \ldots$. Identify the process for Y_t. (3 points)

   (b) Calculate the autocorrelation function for the $AR(1)$-process

$$Y_t = \alpha Y_{t-1} + \varepsilon_t, \quad |\alpha| < 1, \quad \varepsilon_t \sim IID\left(0, \sigma_\varepsilon^2\right). \qquad \text{(3 points)}$$

4. **Choose** either (a) or (b)

   (a) Describe the estimation and testing for cointegration. (6 points)

   or

   (b) Assume that

$$\begin{aligned} X_t &= Z_t + u_t, \quad \text{with } Z_t = \mu + Z_{t-1} + v_t, \quad \text{and} \\ u_t &\sim IID\left(0, \sigma_u^2\right), \quad v_t \sim IID\left(0, \sigma_v^2\right), \quad \text{and } E\left[u_t v_{t-i}\right] = 0 \quad \forall i. \end{aligned}$$

   Calculate $ACF(1)$ for ΔX_t. (6 points)