ECONOMICS 7344, Spring 2004
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Midterm Exam 2 — 6 questions. All sub-questions carry equal weight.

1. (12%) Let

$$x_t = 17 + u_t + 3 * u_{t-1} ,$$

where u_t is white noise.
a) If u_{-1}=10, and $x_0 = 4$, what is
$E_0(x_1)$ and $E_0(x_2)$?

Given the AR(1) process

$$x_t = 3 + 0.5 * x_{t-1} + u_t$$

b) Is this process stable? (Explain your answer.)
c) Assume u_t has variance 1 and X_0 is given as a stochastic variable having mean 6 and variance 4/3.
Is the time-series $X_0, X_1, X_2, ...$ stationary?

2. (16%) a) Derive an approximate relation that shows the relation of consumption growth to a time-varying interest rate under the assumption of CRRA utility. Be very explicit about when you are using approximations.
b) In which case can you predict the sign of the impact on current consumption of a decrease in the current interest rate?

3. (20%) Assume that Hall's PIH-model holds. Assume that the rate of interest is 10% and that labor-income follows the ARMA-process

$$y_t = 50 + 0.8y_{t-1} + 0.4y_{t-3} + u_t + 0.5u_{t-1} ,$$

where u_t is iid.
a) Give the correct formula for calculating the change in consumption in year t in response to an innovation u_t.
b) Calculate (this time we want the number) the change in consumption in year t in response to a 100$ innovation u_t.

4. (20%) For Hall's PIH-model:
a) What is meant by Excess Sensitivity of Consumption?
b) What is meant by Excess Smoothness of Consumption?

Please turn over

5. (12%) Consider the CAPM-model.
a) Explain the concept of the efficient frontier.
b) The CAPM-model makes a very strong prediction about the optimal portfolio held by each investor. What is the prediction and explain how to get this prediction.

6. (20%) Assume that an agent lives for 4 periods and that he or she is credit rationed in period 3.
Derive the Euler equation for investment in period 1 in a general asset paying a random gross return R_2 in period 2.