ECONOMICS 7344, Spring 2010
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Midterm Exam 2, April 5 — 4 questions with a total of 102 points. All sub-questions carry equal weight.

1. (30%) Consider the AR model

$$y_t = 30 + 0.8y_{t-1} + u_t ,\tag{1}$$

where u_t is white noise.

a) Is this model stable?

Now assume that you have the model for income:

$$y_t = 13 + u_t + 0.2u_{t-1} + .4u_{t-2} .\tag{2}$$

b) Calculate the variance of y_t and all auto-covariances.

c) Consider model (1). If $y_0 = 20$ and $y_{-1} = 100$, what is $E_0 y_1$? What is $E_0 y_2$? What is (approximately) $E_0 y_{1000}$?

d) Consider model (2). If $u_0 = 10$, $u_{-1} = 0$, and $u_{-2} = 10$, what what is $E_0 y_1$? What is $E_0 y_2$?

e) Assume that Hall's PIH-model holds and assume the rate of interest is 10%. Assume asset holdings at the beginning of period 0 are zero. Find the level of consumption C_0 in year 0 (still using model (2) for income).

f) Assume that $u_1 = 20$. Find C_1.

2. (20%) For Hall's PIH-model explain:

a) What is meant by Excess Sensitivity of Consumption?

b) What is meant by Excess Smoothness of Consumption?

c) Suggest a way to test for Excess Sensitivity of Consumption.
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3. (20%) A consumer lives for 3 periods and maximizes

$$\log C_1 + \frac{1}{1.1} \log C_2 + \frac{1}{1.21} \log C_3 \ .$$

a) Assume the consumer optimally choose $C_1 = 20$ and $C_2 = 22$. What is the safe rate of interest from period 1 to period 2?

b) If the safe rate of interest from period 2 to period 3 is 10%, what is C_3?

4. (32%) Consider the CAPM-model.

Assume the world only have two outcomes ("states of the world"). Let X be an asset whose payout PO_X is 100 if "shine," a situation where the market return is 10 percent. "Shine" has probability 0.5. If "rain," the pay-out to the asset is 50 and the market return is 0; "rain" also has probability 0.5. Assume that the safe rate of interest is 1 percent.

a) What is the expected return (ER_X) to an investment in X?

b) What are the possible returns R_X and their probabilities (in other words, what is the distribution of R_X)?

c) What is the price of asset X in the initial period?

Now assume that Y is an asset whose payout PO_Y is 200 if "shine" and 100 if "rain."

d) What is the expected return ER_Y? (Hint: you can provide the answer easily, if you consider the relation between the payout to X and the payout to Y.)