ECONOMICS 7344, Spring 2019
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Final Exam, May 2—5s questions, total weight is 100%, all sub-questions carry equal weight.

1. (10%) A consumer lives for 3 periods (periods 1, 2, and 3), earns \$100 in the first period and in the third period. In period 2, income is either \$90 or \$110 with probabilities of 0.5. The consumer has a quadratic utility function and is allowed to freely borrow and lend at an interest rate that equals his or her rate of time preference which we for simplicity set to 0 (i.e., the net rate of interest is 0).
A) Is $E_1(C_2) = C_1$?
B) Is $C_2 = C_1$?
C) Is $C_3 = C_2$?

2. (15%) Assume that income follows the ARMA process

$$y_t = 3 + 0.4y_{t-1} + e_t \,,$$

where e_t is white noise.
a) Is this time-series process stable?
b) What is $E_{t-2}y_t$ if $y_{t-2} = 5$ and $y_{t-3} = 10$?
Assume instead

$$y_t = 3 - .9y_{t-1} + e_t + e_{t-1} \ .$$

b) What is $E_{t-2}y_t$ if $y_{t-2} = 5$?

3. (35%) Consider the case of the 2 agents, 2 periods, 2 states-of-the-world model of Obstfeld-Rogoff Chapter 5.2 (where agents can trade using a full set of Arrow securities). Assume that both agents have quadratic utility functions $U(C_0) + E_0U(C_1)$, where $U(C_t) = aC_t + bC_t^2$. Assume that $a = 20$ and $b = -0.5$.
Assume that the endowment of the first agent is $y_0 = 2, y_1 = 2$ and that the endowment of the second agent in period 0 is $y_0^* = 2$ and in period 1 his or her endowment is $y_1^* = 4$ in the "good state" g. In the "bad state" b the endowment of the second agent is $y_1^* = 4/3$. Assume that the good state happens with probability 0.25.
a) Find the price of the Arrow securities for state g and state b.
b) Explain intuitively why the price of the Arrow security for one of the states may be higher than for the other state. You need to give two (partial) reasons and explain the logic.
c) Find the safe rate of interest.
d) Assume that the agents now DO NOT have access to Arrow securities but that they have access

to a risk-less bond. Continue assuming that the two agents make up the world. Find the amount of the bond purchased or sold in period 1 by each of the agents and the rate of interest. (The answer here may be simple to find if you look carefully at the relevant equations.)
e) Explain the logic of the answer in d) [even if you didn't solve d)]. You need to explain the logic of why the rate of interest will be positive/negative. (Hint: The answer in this case with a quadratic utility function is different from the one you get with a CRRA utility function.)

4. (20%) Assume that an agent has utility function

$$U(C_0) + \frac{1}{1.10} E_0 U(C_1) \ ,$$

where $U(C) = \ln C$. Assume that there are two states of the world, denoted a and b, in period 1 with both states occurring with probability 0.5. Further assume the agent has income $Y_0 = 10$ and $Y_1 = 20$.
a) Assume that the agent can invest only in a safe bond paying net interest $r_f = 0.10$. Find the agent's consumption in periods 0 and 1.
b) Now assume that the agent still can invest in the safe bond but the agent also has access to an equity with gross returns $1 + r_s^a = 0\%$ in state a and $1 + r_s^b = 330\%$ in state b.
Find the agent's consumption in period 0 and period 1 (both states a and b).

5. (20%) a) Explain the Campbell-Mankiw "rule-of-thumb" consumer model. Here I do not want you solve anything. You can use only (precise) words if you wish.
b) Explain how the model can be estimated using instrumental variables estimation. Here I want you to write down equations.