ECONOMICS 7344, Spring 2011
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Midterm Exam 1 — 4 questions. All sub-questions carry equal weight.

1. (25%) Consider the AR model

$$y_t \ = \ 37 \ + \ 2y_{t-1} \ + \ u_t \ ,$$

where u_t is iid white noise with variance 3.

a) Is this model stable?

b) Assume y_0 is fixed constant $y_0 = 5$. Calculate the variance of y_t for all t.

c) What is $E_0 y_1$? What is $E_0 y_2$?

$a(L)$ is the lag polynomial $1 + .5 * L$ and $b(L) = 1 + .3 * L - 2 * L^2$, define $c(L) = a(L) * b(L)$.

d) Find $c(L)$.

e) Define $z_t = c(L)y_t$ and write down the ARMA model for z_t.

2. (20%) Explain in detail the logic of Lucas' imperfect information model. (You don't have to derive the equations, or even write down equations, but if you use words you need to make sure that you are precise.)

3. (20 %) a) In the IS-LM model, if the government keeps the interest rate constant rather than the money supply, would the effect an increase in government consumption on output be larger or smaller or the same as in the standard IS-LM model? Illustrate with graphs.

b) Explain what is meant by the expectations augmented Phillips curve?

c) Explain how small menu costs can have large welfare implications. (Explain what is meant by menu costs first).

Please turn over

4. (35%) Assume that a representative agent has a utility function

$$(*)\ \ U(C_i, L_i) \ = \ C_i - \delta L_i^2 \ ,$$

where δ is a positive parameter, L_i is effort (hours worked), and $C_i = P_i Q_i / P$. Assume that agent i supplies output Q_i produced by the production technology $Q = L$. The agent sets the relative price P_i/P under monopolistic competition, where P is the aggregate price index (assume there a many goods so a change in P_i doesn't change P) and the demand function is

$$Q_i = Y \, (\frac{P_i}{P})^{-3} \ .$$

a) Find the optimal relative price $\frac{P_i}{P}$ for agent i maximizing the utility function (*) (where the agent takes P as given).

b) Find the equilibrium level of output in the economy.

c) Does the equilibrium level of output increase or decrease with the parameter δ. Explain the intuitive logic behind this result.

d) Solve the model assuming perfect competition (many agents of type i).

e) Compare the solutions you found in b) and d). Explain intuitively why the larger one is larger (if you didn't find the solution you can earn half the points for explaining the logic of which one should be larger).