ECONOMICS 7344, Spring 2015
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Midterm Exam 2, April 6—5 questions. All sub-questions carry equal weight except where otherwise indicated.

1. (20%) Assume that a representative agent has a utility function

$$U(C, L) \ = \ C^2 - L^3 \ .$$

(The convex shape of C^2 is unusual, but it is not a typo.) Assume that agent i supplies output Q_i produced by the production technology $Q = L$. The agent sets the relative price P_i/P, where P is the aggregate price index (assume there a many types of agents so a change in P_i doesn't change P) and faces a demand function

$$Q_i = Y \, (\frac{P_i}{P})^{-2} \ .$$

a) Find the agent's supply function when the agent takes P as given.
b) Find the equilibrium level of output in the economy.
c) What level of output would a social planner choose?

2. (30%) Assume output in an economy is determined by the equilibrium condition that aggregate demand E is equal to total output Y. Assume that $E = C + I + G$ where consumption $C = 2 + .6 * (Y - T)$ (T is net taxes), investment is exogenous at 1, and government consumption is exogenous at 2. T equals 2. Assume that inflation and expected inflation is 0 and that $P = 1$. Money supply is exogenous at 10, and the demand for money is $P * L(Y, r)$ where $L(Y, r) = Y - 0.1 * r$. (The numbers are not chosen to give reasonable values for the solution, so don't worry about "crazy" interest rates etc.)
a) Derive the IS curve (meaning give the equation with the actual intercept and slope implied by the numbers given).
b) Solve the model for the equilibrium level of output and interest rate.
c) What happens if M doubles to 20? (Find the new level of output and interest rate.)
d) Assume that government consumption and net taxes both doubles to 4. What is the effect on output?

3. (20%) This is about the CAPM. Assume the market return has a standard deviation of 0.2, Consider three stocks a,b, and c. Stock a has mean return $Er^a = .1$, standard deviation of returns $std^a = .2$, covariance with the market return 1.0; stock b has mean return $Er^b = 0.05$, standard deviation of return $std^b = 0.2$, and covariance with the market return 0.5, stock c has mean return $Er^c = 0.0$, standard deviation of returns $std^c = .8$, covariance with the market return 0.0.
a) What is the return to the safe asset?
b) What is the return to the market portfolio?

4. (15%) a) What is meant by "efficient markets" (semi-strong form, in the sense of Fama).
b) Assume markets are efficient, as in part a, and assets are priced with a pricing kernel. Find the pricing kernel.
c) What is the relation between the safe rate of interest and the pricing kernel? (This question is independent of question b.)

5. (15%) The consumer maximizes $\Sigma_{t=0}^{\infty} 0.9^t E_0 U(C_t)$. Consider the case with utility is exponential $U(C) = -\exp(-C)$ and C_t is distributed i.i.d. (independently, identically, distributed) $N(\mu, \sigma^2)$. .
a) Assuming the Euler equation holds, what is the (period 0) price of a one-period discount bond?
b) What is the price of a two-period discount bond?
Now assume that utility is quadratic $U(C) = C - \frac{1}{200}C^2$
c) What is the price of a one period discount bond?
d) Give one reason, in terms of concepts from class, why the price is now different.