Some Practice Problems for the Final Exam

1. Define the following:
   
   (a) fiat currency
   
   (b) Friedman’s rule
   
   (c) equity premium puzzle
   
   (d) riskfree rate puzzle

2. An unemployed worker comes to a fork in the road. Down one road is a town, Blakeville; down the other is Hongtown. In both towns, unemployed workers receive one wage offer, $w$, per period to work at a randomly drawn wage. Each wage offer in Blakeville is independently drawn from the distribution, $\text{Prob}(w_i \leq w) = F(w)$, while each wage offer in Hongtown is independently drawn from the distribution, $\text{Prob}(w_i \leq w) = G(w)$. The mean of the two distributions are equal but the variance of the wage distribution in Hongtown is twice that of Blakeville.

   In both towns, the worker has the option of rejecting a wage offer, in which case she receives $c$ this period in unemployment compensation and waits until next period to draw another wage offer. If the worker accepts the offer to work at $w$ she receives $w$ each period forever. There is no recall of past offers. The unemployed worker wishes to maximize $E \sum_{t=0}^{\infty} \beta^t y_t$, where $y_t$ is her income in period $t$.

   Will the worker have the same reservation wage in both towns? Which road should the worker take? Explain.

3. What an effort it is to do growth accounting!

   Consider an artificial economy which is well described by the labor hoarding model presented in Burnside, Eichenbaum, and Rebelo’s 1993 paper. That is, in this economy the main NIPA time series are generated by a single simulation of the model. Suppose a researcher in this economy uses data on real output, the capital stock and hours worked to compute the Solow residual via standard growth accounting.

   (a) In this economy, does the Solow residual provide an accurate measure of total factor productivity? Explain.

   (b) Will the growth rate of the Solow residual be correlated with the growth rate of government spending? Why or why not?

   (c) Will the researcher find that measured labor productivity is pro-cyclical or counter-cyclical?
4. Is a beer in Friedman’s bar a credit good?

Consider a consumer living in a cash-in-advance economy like the one presented in class. Her preferences are:

\[ E \sum_{t=0}^{\infty} \left( \frac{1}{1+\rho} \right)^t \ln(c_{1t} \cdot c_{2t}), \]

where \( c_{1t} \) is her consumption of cash goods and \( c_{2t} \) is her consumption of credit goods. The money supply grows at a constant rate \( \pi \) and the resource constraint is \( c_{1t} + c_{2t} = y(s_t) \), where \( s_t \) can take on \( n \) possible discrete values and follows a Markov chain. Cash goods are subject to a cash-in-advance constraint.

(a) If the consumer is behaving optimally, to what magnitude does she equate the marginal rate of substitution between cash and credit goods? [State both sides of the equation, so I know how you are defining the MRS. Define all terms you need to introduce.]

(b) Show that an expected inflation rate of \( -\frac{\pi}{1+\rho} \) maximizes current period utility at date \( t \). Explain the intuition behind this result.

5. Consider the situation of an individual worker in an economy in which there are two types of jobs: low wage (\( w_1 \)) jobs and high wage (\( w_2 > w_1 \)) jobs. Low wage jobs are always available. High wage jobs are sometimes available. We suppose the worker maximizes

\[ E \left( \sum_{t=0}^{\infty} \beta^t w_t \right). \]

If the worker has a low wage job today, he can keep this job forever, or he can search for a high wage job. If he searches for a high wage job, he earns nothing today, but may find a high wage job beginning next period with probability \( \theta \).

If the worker instead has a high wage job today, he earns \( w_2 \) today but with probability \( \lambda \) loses the job and moves to the low wage job next period.

(a) Display this worker’s Bellman equation. [Hint: Get separate expressions for \( v(w_1) \) and \( v(w_2) \).]

(b) For what values of \( w_1/w_2 \) (in terms of the parameters \( \beta, \lambda, \) and \( \theta \)) will the worker with the low wage job always choose to search rather than work at \( w_1 \)?
6. An Odd Yet Still Even Problem

Consider an economy consisting of a large and equal number (each of mass 1) of two types (called odds and evens) of infinitely lived agents. There is one kind of good, which is nonstorable. ‘Odd’ agents receive the endowment stream \( \{y^o_t\}_t=0^\infty \), while ‘even’ agents receive the endowment stream \( \{y^e_t\}_t=0^\infty \). The endowment streams are given by:

\[
y^o_t = \begin{cases} 
1 & \text{if } t \text{ is odd} \\
0 & \text{if } t \text{ is even}
\end{cases}
\]

and

\[
y^e_t = \begin{cases} 
0 & \text{if } t \text{ is odd} \\
1 & \text{if } t \text{ is even}
\end{cases}
\]

Agents of type \( i \) wish to maximize:

\[
\sum_{t=0}^\infty \beta^t \ln c^i_t, \quad i = \text{odd, even}, \quad \beta \in (0,1)
\]

where \( c^i_t \) is the time \( t \) consumption of the single good by an agent of type \( i \).

Part I: Complete Markets

(a) Define a complete markets (or Arrow-Debreu) competitive equilibrium for this economy. State who trades what with whom when.

(b) Compute all the price and quantities for the complete markets competitive equilibrium.

No Borrowing or Lending, but Currency

Assume that all borrowing and lending is prohibited. At time \( t = 0 \), all odd agents are endowed with \( H_{t-1} \) units of an unbacked, inconvertible currency, and all even agents are endowed with 0 units of currency. The currency is denominated in dollars and is perfectly durable. Currency is the only object that agents are permitted to carry over from one period to the next. Agents cannot issue their own currency. There is a government that taxes and prints new currency, subject to the budget constraint

\[
H_t = H_{t-1} + (z - 1)H_{t-1}
\]

where \( z > 0 \), and where \( H_{t-1} \) is the aggregate stock of currency. At time \( t \), the government makes a transfer of \( (z - 1)H_{t-1} \) units of currency, on terms to be described in more detail below. Let \( p_t \) be the price level at time \( t \), denominated in units of dollars per time \( t \) consumption good.
Part II: Transfers Proportional to Initial Money Holdings

In this part, assume that the government hands out the new currency (or withdraws old currency if $z < 1$) proportionally to initial holdings of currency. That is, if an agent holds $h_{t-1}$ units of currency from $t-1$ to $t$, the government augments her holdings by $(z-1)h_{t-1}$ units at the beginning of period $t$.

(c) Define a stationary equilibrium with valued fiat currency.

(d) Compute a stationary equilibrium with valued currency. Is the allocation associated with the equilibrium that you computed Pareto optimal? Explain.

Part III: Lump Sum Transfers

In this part, assume that the transfers are lump sum. That is, each agent, regardless of type, receives $(z-1)H_{t-1}/2$ units of currency from the government at the beginning of $t$.

(e) Compute a stationary equilibrium with valued fiat currency.

(f) Compare the formula for the price level that you obtained in (d) with the one you obtained in (e). Which economy, that of part II or that of part III, is more consistent with the quantity theory of money?