Intermediate Macroeconomic Theory II, Winter 2008
Instructor: Dmytro Hryshko
Final Exam (40 points+5 bonus points). April 16.

1. (**18 points**) Use the IS–LM and AD–AS models to determine the short- and long-run effects of each of the following on the equilibrium values of the output, the real interest rate, consumption, investment, the price level, and the real money balances.

   (a) (**8 points**) A *fall* in lump-sum taxes, with *no change* in government purchases. Consider both the case in which the Ricardian equivalence holds and does not hold. Briefly state the essence of the Ricardian equivalence, and the reasons for why it may fail.

(b) (**5 points**) Assume the Mundell-Fleming model and a small open economy with the fixed exchange rate regime. In the new equilibrium, how aggregate income, the nominal and real exchange rates, and the trade balance compare with their respective values in the old equilibrium when the world interest rate, r^*, increases? (You do not need the AD–AS schedule here.)

(c) (**5 points**) A permanent increase in the price of oil (a permanent adverse supply shock). Assume the following: a) the permanent supply shock lowers both the expected future MPK and households' expected future incomes (*Hint*: there'll be some action on the IS side); b) there is a spike in the aggregate price level in the short run (*Hint*: there'll be some action on the $SRAS$ side and the LM); c) the short run equilibrium is at the level of output, *smaller* than the *new, long run level of output*.

2. (**7 points**) Suppose that the only shocks in the economy are changes in the assessments of expected inflation π^e, and that the central bank is considering which policy to implement:

   - keeping the money stock constant, or
   - keeping the real interest rate constant.

   Which policy leads to smaller fluctuations in real GDP in response to the economy's shocks? Draw an appropriate IS–LM schedule. (*Hint*: you may use the IS–LM schedule as in the textbook's discussion of the Great Depression, with nominal interest rate on the vertical axis and real GDP on the horizontal axis.)

3. (**5 points**) To fight an ongoing inflation, the government makes raising wages or prices illegal. However, the government continues to increase the money supply each year. The economy starts at full-employment output, and this long-run level of output remains constant.

   (a) (**1 point**) Which Solow model may fit the fact that the long-run level of aggregate output remains constant?

(b) (**2 points**) Using the Keynesian AD–AS and the IS–LM frameworks, show the effects of the government's policies on the economy. Assume that firms meet the demand at the fixed price level. Show the effects of the policy on the IS and/or LM, if any, for at least two years.

(c) (**2 points**) After several years in which the controls have kept prices from rising, the government declares victory over inflation and removes the price controls. What happens?

4. (**10 points**) Consider someone deciding how to allocate her consumption over two periods. She has utility function $U(C_1, C_2) = -0.5(\overline{C} - C_1)^2 - 0.5\beta(\overline{C} - C_2)^2$, $0 \leq \beta \leq 1$. β is called the time discount factor, and measures how one values current consumption versus future consumption, or, in other words, one's impatience. (The lower the β, the more impatient you are, i.e., the more you value current consumption relative to future consumption, other things being equal.) Assume that income in the first period is Y_1, income in the second period 2—Y_2, the real interest rate is r and $\overline{C}$ is the 'bliss' level of consumption. (*Hint*: for this utility function, $MU_1 = \overline{C} - C_1$, and $MU_2 = \overline{C} - C_2$.) Assume that the real interest rate is $r = 0$, and $\beta = \frac{1}{1+r}$; income in the first period is $Y_1 = 40$, in the second period is $Y_2 = 120$.

(a) (**5 points**) Solve for <u>optimal consumption</u> in each period, assuming the consumer can freely save or borrow at the 0% interest rate. Determine the <u>optimal savings</u> in the first period of life.

(b) (**3 points**) Now suppose that, instead, the agent can save at the rate r, but is unable to borrow at all. Solve for the optimal agent's consumption in each period.

(**2 points**) Who is better off: the borrowing-constrained consumer in (4b) or the consumer in (4a)? And <u>why</u>?

5. (**Bonus (5 points)**) This is a three-period consumption problem. If utility function is $U(C_1, C_2, C_3) = \ln(C_1) + \beta \ln(C_2) + \beta^2 \ln(C_3)$, and consumer can freely save/borrow at the rate r, and his income stream is Y_1, Y_2, and Y_3, what is the optimal consumption in period 1,2 and 3? (*Hint*: The first derivative of $f(y) = k \ln y$, where k is some constant, is $\frac{k}{y}$). β is the time discount factor.

   (a) (**2 points**) a) Write down an Euler optimality equation that links marginal utilities in periods 1 and 2; b) write down an Euler optimality equation that links marginal utilities in periods 2 and 3; c) write down an inter-temporal budget constraint.

   (b) (**3 points**) Utilizing those two Euler equations and the budget constraint, solve for the optimal levels of C_1, C_2, and C_3.

6. (**14 points**) Assume that money demand is derived from the classical quantity equation of money. Assume also that the money demand is stable. These assumptions should affect your answers to <u>all</u> of the sub-questions to follow. (*Hints*: 1) The classical quantity equation of money is $M * V = P * Y$. 2) Stability of money demand implies that income velocity of money is constant. 3) Now, a very 'fat' hint: you should be able to argue that the LM curve in this case is vertical.)

   (a) (**2 points**) Draw the LM curve for this case. Also, describe it in words.

(b) (**3 points**) Suppose that the central bank targets the level of the real interest rate, i.e., adjusts the money supply when the real interest rate changes due to shocks in the economy. Assume also that the economy is currently at the equilibrium defined by the targeted level of the real interest rate, and the level of output *below* the long-run, full-employment level of output. Draw the IS–LM diagram and the full-employment $LRAS$ curve.

(c) (**3 points**) Now suppose that policy advisers tell the government to cut taxes to reach this level of output faster. Draw the IS–LM diagram and the full employment $LRAS$ curve. What happens to the real interest rate, output, and investment?

(d) (**3 points**) If the real interest deviates from its target because of the cut in taxes, what is the action of the central bank? Draw the IS–LM diagram and the full employment $LRAS$ curve. What happens to output, real interest rate, and investment due to this action of the central bank?

(e) (**3 points**) Is fiscal policy effective in this case or not? What causes fluctuations in aggregate output in this economy?