Final Examination Answers

This exam is 80 minutes long, and is worth 80 points. You are given 88 minutes to complete it. Part I is multiple choice, Part II is a short answer. The points are allocated in proportion to the time you should spend on each problem.

**PART I: Multiple Choice** [36 minutes total, 2 points each]. Do NOT explain. (18 problems)

1. Assume that policy makers are pursuing a fixed exchange rate regime and that the economy is initially operating at the natural level. Which of the following will occur as a result of a devaluation?
   a. the real exchange rate will be permanently higher in the medium run
   b. the real exchange rate will be permanently lower in the medium run
   c. the effects of this devaluation on the real exchange rate will be ambiguous in the medium run
   d. the nominal exchange rate will initially increase in the short run and then decrease in the medium run
   e. none of the above

2. Suppose the central bank increases money growth from 3% to 8%. In the medium run, this increase in nominal money growth from 8% to 3% will cause the unemployment rate to
   a. decrease by 5%.
   b. decrease by 3%.
   c. increase by 5%.
   d. increase by 3%.
   e. remain unchanged.

3. An upward-sloping yield curve suggests that financial market participants expect short-term interest rates will:
   a. rise in the future.
   b. fall in the future.
   c. be unstable in the future.
   d. not change in the future.
   e. be equal to zero in the future.

4. Assume that policy makers are pursuing a fixed exchange rate regime. Assume that the economy is initially operating at the natural level (i.e., $Y = Y_n$). Suppose an increase in wealth causes households to increase consumption. This wealth-induced increase in consumption will cause which of the following to occur?
   a. the real exchange rate will be permanently higher in the medium run
   b. the real exchange rate will be permanently lower in the medium run
   c. the effects of this devaluation on the real exchange rate will be ambiguous in the medium run
   d. the real exchange rate will be unchanged in the medium run
5. Suppose individuals now believe that there will be an increase in the future expected interest rate. This increase in the expected future interest rate will cause which of the following to occur in the current period?
   a. an upward shift of the LM curve.
   b. a leftward shift of the IS curve.
   c. the IS curve to become flatter.
   d. the LM curve to become steeper.
   e. none of the above.

6. Which of the following is evidence that consumption depends on total wealth, and not just on current income?
   a. People save very little for their retirement.
   c. A drop in consumer confidence, with unchanged current income, often causes total consumption spending to fall.
   d. All of the above.
   e. None of the above.

7. Which of the following people -- none of whom has any financial or housing wealth -- is most likely to be spending all of their current income?
   a. A low income person expecting continued low income throughout life.
   b. A low income person expecting a dramatic rise in income in the future.
   c. A high income person expecting continued high income throughout life.
   d. A high income person expecting a dramatic drop in income in the future.
   e. A high income person expecting to retire soon, and live for a long time afterward.

8. Which of the following statements is true?
   a. A change in sales should have more impact on current investment if it is expected to be permanent rather than temporary.
   b. On a percentage basis, investment is more volatile than consumption.
   c. In terms of dollars, investment and consumption are about equally volatile.
   d. All of the above.
   e. None of the above.

9. Assume the following: (1) the real cost of a unit of capital is one; (2) the unit of capital is expected to increase a firm's real profit by $10,000 each year, and depreciate by 8% each year ( = .08); and (3) The real interest rate is 2% (r = .02). What is the "user cost" or "rental cost" of this unit of capital?
   a. 0.02
   b. 0.06
   c. 0.10
   d. 0.08/0.02 = 4
   e. none of the above
10. Suppose an individual experiences a $20,000 increase in real income and the individual believes this increase in income is permanent. Theory suggests that this individual's current consumption will:
   a. remain unchanged.
   b. increase by more than $20,000.
   c. increase by at most $20,000.
   d. decrease or remain unchanged, depending on the value of the real interest rate.
   e. decrease, remain unchanged, or increase, depending on the value of the real interest rate.

11. Which of the following would be a violation of the rational expectations assumption?
   a. "Over the past twenty years, people have consistently under-predicted the inflation rate for the following year."
   b. "Over the past twenty years, people have never once accurately predicted the inflation rate for the following year."
   c. "The Fed's announcement that it might ease interest rates caused an immediate drop in short-term rates, even before the Fed took any action."
   d. All of the above.
   e. None of the above.

12. Suppose there is a fiscal expansion in the current period. This fiscal expansion will tend to cause a smaller increase in current output when:
   a. an increase in current output causes an increase in expected future output.
   b. an increase in the current interest rate causes expectations of expansionary monetary policy in the future.
   c. an increase in the current interest rate causes an increase in expected future interest rates.
   d. a. and b.
   e. all of the above.

13. Which of the following, all else fixed, will cause the real exchange rate to increase?
   a. a nominal depreciation
   b. a reduction in the foreign price level.
   c. a reduction in the domestic price level.
   d. all of the above.
   e. none of the above.

14. In the absence of technological growth, a reduction in the saving rate will NOT affect which of the following variables in the long run?
   a. output per worker.
   b. the growth rate of output per worker.
   c. the amount of capital in the economy.
   d. capital per worker.
   e. none of the above

15. Suppose two countries are identical in every way with the following exception. Economy A has a higher saving rate than economy B. Given this information, we know with certainty that:
   a. steady state consumption in A is higher than in B
   b. steady state consumption in A is lower than in B
   c. steady state consumption in A and in B are equal
   d. steady state growth of output per worker is higher in A than in B
16. Assume: (1) the rate of depreciation is 10% per year, (2) the population growth rate is 2% per year, and (3) the growth rate of technology is 3% per year. Which of the following equals the annual growth rate of "effective labor" in the steady state in this economy?
   a. 2%.
   b. 3%.
   c. 5%.
   d. 10%.
   e. 15%.

17. Which of the following represents the appropriability of research?
   a. the protection given to new products by the law
   b. how R&D spending translates into new ideas
   c. the extent to which firms benefit from the results of their own R&D spending
   d. the rate of technological progress
   e. both b and c

18. Assume that an economy experiences both positive population growth and technological progress. Once the economy has achieved balanced growth, we know that the capital per worker ratio (K/N) is:
   a. constant
   b. growing at a rate of \( g_A - g_N \)
   c. growing at a rate of \( g_N \)
   d. growing at a rate of \( g_A \)
   e. growing at the same rate as \( Y/N \)

**PART II: Short Answer** [44 minutes total]

1. (6 minutes total) Finance. Suppose the one period interest rate is 20%, and you think a particular stock will pay a dividend of $24 next year; further you think the price of the stock in one year will be $240. What price would you be willing to pay for that stock today? Show your work, and box in your answer!

\[
Q_t = \frac{D_{t+1}^e}{(1 + i_t)} + \frac{Q_{t+1}^e}{(1 + i_{t+1})}
\]

\[
Q_t = \frac{24}{1 + 0.20} + \frac{240}{1 + 0.20}
\]

\[
Q_t = 20 + 200 = 220
\]

2. (8 minutes total) Two country model. Consider two equal sized economies (* denotes foreign).
One can rewrite both:

\[ Y = A_0 + c_1 Y + x_1 Y^* - m_1 Y \]

\[ Y^* = A^*_0 + c^*_1 Y + x^*_1 Y - m^*_1 Y^* \]

\[ Y(1 - c_1 + m_1) = A_0 + x_1 Y^* \]

\[ Y^*(1 - c^*_1 + m^*_1) = A^*_0 + x^*_1 Y \]

2.1 (4 minutes) Solve for equilibrium home income. Show your work, and box in your answer!

Substitute the fourth equation into the third:

\[ Y(1 - c_1 + m_1) = A_0 + x_1 \left( \frac{1}{1 - c^*_1 + m^*_1} (A^*_0 + x^*_1 Y) \right) \]

Solving for Y:

\[ Y \left( 1 - c_1 + m_1 - \frac{x_1 x^*_1}{1 - c^*_1 + m^*_1} \right) = A_0 + x_1 \left( \frac{A^*_0}{1 - c^*_1 + m^*_1} \right) \]

\[ Y_0 = \bar{\alpha} \left[ A_0 + x_1 \left( \frac{A^*_0}{1 - c^*_1 + m^*_1} \right) \right] \]

\[ \bar{\alpha} \equiv \left( 1 - c_1 + m_1 - \frac{x_1 x^*_1}{1 - c^*_1 + m^*_1} \right)^{-1} \]

2.2 (4 minutes) show what is the multiplier for an increase in home autonomous spending. Show your work, and box in your answer!

Take the total differential to the answer to 2.1.

\[ \Delta Y = \bar{\alpha} \left[ \Delta A + x_1 \left( \frac{1}{1 - c^*_1 + m^*_1} \right) \Delta A^* \right] \]

Holding foreign domestic autonomous spending constant yields:

\[ \Delta Y = \bar{\alpha} \Delta A \]

\[ \Delta Y / \Delta A = \bar{\alpha} \]

\[ \Delta Y / \Delta A = \bar{\alpha} \]

3. (22 minutes total) The open economy. Suppose the real side of the economy is given by:
\[ Y = C(Y - T) + I(Y, i) + G + NX(Y, Y^*, \left(\frac{1+i}{1+i}\right)\bar{E}^*) \]

And the LM curve is:
\[ \frac{M}{P} = YL(i) \]

3.1. (4 minutes) Show equilibrium in this economy, with both the IS-LM diagram and interest parity relation diagram. Assume the economy is on floating exchange rates, and the original equilibrium interest rate exceeds zero.

3.2. (4 minutes) Show, with both the IS-LM diagram and interest parity relation diagrams, what happens if the United States imposes contractionary fiscal policy \( \Delta G < 0 \), with the ending interest rate above 0.
The IS curve shifts inward, by distance $\alpha \Delta G$, where $\alpha$ is the equivalent of the multiplier for the Keynesian cross. Output falls and interest rate declines, inducing a decline (depreciation) of the currency.

3.3 (4 minutes) Now redraw 3.1, assuming that the economy is initially at the zero interest rate bound.

This is the liquidity trap, but in an open economy.

3.4. (6 minutes) Show, with both the IS-LM diagram and interest parity relation diagrams, what happens if the United States imposes contractionary fiscal policy $\Delta G<0$, starting with a situation where the economy is initially at the zero interest rate bound. Is the negative impact on output larger or smaller (in absolute value) when one is at the zero interest rate bound, relative to when one is above?

The IS shifts in the same horizontal distance as in 3.2. However the decrease in income is more pronounced, because the exchange rate does not depreciate, thereby softening the blow.
3.5 (4 minutes) Return to question 3.2, and assume the country pegs its exchange rate to the foreign country. Using IS-LM and the Interest Rate Parity relationship, show if the impact of the contractionary fiscal policy has a larger or smaller impact than that obtained in 3.4.

In order to keep the exchange rate constant at $E_0$, the central bank would need to contract money supply shifting in the LM curve (black arrow). The negative impact on output is the same as in 3.4.

4. (8 minutes total) Long run growth.

4.1 (4 minutes) Graphically illustrate and explain the immediate effects of an increase in the population size on the Solow growth model with no technological growth (Chapter 11).

The increase in population shifts $K/N$ from $K^*/N$ to $K_0/N$ (orange arrow). Output per worker declines from $Y^*/N$ to the height indicated by point B.
4.2 (4 minutes) Redraw the graph. Explain what happens to the rate of growth of output per worker and the rate of growth of output as the economy adjusts over time to the new steady state.

At point B, investment per worker exceeds the amount of investment needed to keep K/N constant for a given rate of depreciation and of population growth. Hence, K/N increases (blue arrow). When K/N reaches K*/N, the steady state is re-attained, and K/N stabilizes.