Queen's University Final Examination
Faculty of Arts and Science
Department of Economics

ECON 222 001-002: Professors Michael Kennedy and Shouyong Shi
April 22, 2025
Bartlett Gym

INSTRUCTIONS TO STUDENTS:

This examination is 3 HOURS in length.

There are 2 sections to this examination: Section A consists of multiple-choice questions. You should answer all 22 of them. Each question is worth 1 mark for a total of 22 marks. Section B consists of 3 long questions. Each long question is worth 26 marks for a total of 78 marks.

Marks will be awarded on the basis of the logical arguments given to support your answers.

Please record multiple choice answers on the provided scantron, and long answers in the distributed answer booklets.

> **The following aid is allowed:**
> Casio FX-991 calculator

PLEASE NOTE:
Proctors are unable to respond to queries about the interpretation of exam questions. Do your best to answer exam questions as written.

Put your student number on all pages of all answer booklets, including the front.
Upon completion of your exam, you MUST hand in the following three items:
   The multiple choice card, completed correctly;
   The answer booklet clearly labeled with your student number, name and class section;
   This exam question paper.

GOOD LUCK!

Student Name:

Student Number:

Multiple Choice Instructions. Multiple-choice answers on the answer sheet are marked by an optical scanner. It reads only what is in the rectangle. Fill it in completely and stay within its limits. **You must use a soft lead (e.g. "HB") pencil** to fill in the Answer Sheet. Remember, if you change your answer, COMPLETELY ERASE IT, and correct. For all questions there is only one best (correct) answer; if two or more choices are marked, the item will be graded incorrect.

Before you begin:
1. Write your Student # under "**ID Number**" on the Answer Sheet and fill in the appropriate rectangle below each number. **See example below.**
2. Print your **Last Name** followed by first name in the appropriate space, and fill in the appropriate rectangle under each letter.
3. Under "**Test Form**", fill in "**A**" as indicated at the top of this page (see example below). Please ensure that you have entered the correct **Test Form**.

Section A (multiple choice questions) (**22 points in total**):

Problem 1. Answer ALL of the following questions (1 point for each question). Choose the _one_ alternative that best completes the statement or answers the question.

1.The growth accounting equation
(A) is used to calculate the total factor productivity.
(B) measures empirically the relative importance of the sources of output growth.
(C) is the production function written in growth rate form.
(D) all of the above.

2. The Golden Rule of the capital stock is the level of capital stock that
(A) maximizes the saving per worker in the steady state.
(B) maximizes the amount of capital in the economy.
(C) maximizes the consumption per worker in the steady state.
(D) maximizes the output per worker in the steady state.

3. In the basic Solow (neoclassical growth) model, if productivity does not grow in the long run
(A) consumption will be constant.
(B) output per worker will be constant.
(C) output will grow at the same rate as the population growth.
(D) both B and C are correct.

4. For something to perform well as a medium of exchange, it must be
(A) issued by a Central bank.
(B) backed by gold.
(C) an inherently valuable commodity.
(D) readily exchangeable for other goods and services.

5. Suppose that a default-free government bond with a face value $1000, a maturity of 2 years, and no coupon payment is sold at a price $920. The yield on the bond is:
(A) 3.75%.
(B) 4.00%.
(C) 4.25%.
(D) 4.50%.

6. If the yield curve is inverted, the market participants expect
(A) the short-term interest rate to fall
(B) the short-term interest rate to rise
(C) the central bank to reduce the money supply
(D) the risk premium on long-term bonds to increase.

7. Lower interest rates increase the real quantity of money demanded
(A) by making alternative non-monetary assets look relatively less attractive to wealth holders.

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(B) by causing a decrease in the issuance of corporate debt.

(C) by increasing government interest payments, which in turn increase taxes, lowering disposable income.

(D) by causing investors to discount the future less heavily.

8. Suppose that the Central Bank of Canada announces an increase in the nominal interest rate. It is most likely to implement this change by

(A) selling government bonds to the public.

(B) selling newly issued government bonds directly to the government itself.

(C) purchasing government bonds from the public.

(D) taxing individuals more.

9. Which of the following variables is pro-cyclical and lagging real GDP?

(A) nominal interest rate

(B) unemployment rate

(C) investment

(D) real interest rate.

10. Which of the following statements is not true about business cycles?

(A) Once an expansion or contraction begins it lasts for a while.

(B) Economic variables and prices move in patterns along with the business cycle.

(C) The maximum point of an economic expansion is referred to as the "peak".

(D) Stock prices are lagging real GDP.

11. Which of the following would shift the LM curve up?

(A) a decrease in the supply of money

(B) an increase in taxes

(C) an increase in consumer spending

(D) an increase in the supply of money.

12. Which of the following would shift the FE line to the left?

(A) an increase in the future marginal productivity of capital

(B) an increase in the capital stock

(C) a policy cutting the amount of working-age immigration into Canada

(D) an increase in the depreciation rate of capital.

13. The IS curve would unambiguously shift up if there were

(A) an increase in both government purchases and corporate taxes.

(B) a decrease in both corporate taxes and the expected future marginal productivity of capital.

(C) an increase in both government purchases and the expected future marginal productivity of capital.

(D) an increase in the expected future marginal productivity of capital and a decrease in the expected future output.

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14. If people's expectations of inflation decrease from 6% to 3%, what will happen in the short-run?

(A) nominal interest on non-monetary assets rises, a relative increase in the real money demanded, LM curve shifts down.

(B) real interest on non-monetary assets rises, a relative decrease in the real money demanded, LM curve shifts up.

(C) nominal interest on money remains the same, a relative increase in the real money demanded, LM curve shifts up.

(D) the real interest rate on money rises, a relative increase in the real money demanded, LM curve shifts up.

15. If government spending permanently decreases, what happens in the long-run to return the economy to a general equilibrium?

(A) The price level decreases causing more demand for goods and services, IS curve shifts up.

(B) The price level increases causing the real money supply to decrease, LM curve shifts down.

(C) The price level in the economy decreases causing an increase in real money supply, LM shifts down

(D) The real interest rate is higher causing more investment in non-monetary assets, LM curve shifts up.

16. Relative purchasing power parity only holds if
(A) the nominal exchange rate is constant.
(B) the real exchange rate is constant.
(C) purchasing power parity holds between two countries.
(D) purchasing power parity only holds if a currency is undervalued.

17. Assuming flexible exchange rate, which of the following statements is not true?
(A) An increase in foreign income leads the exchange rate to appreciate.
(B) A decrease in the quality of domestic goods causes the exchange rate to appreciate.
(C) An increase in the domestic real interest rate causes the exchange rate to appreciate.
(D) An increase in the quality of domestic goods causes the exchange rate to appreciate.

18. Suppose that the foreign real interest rate increases. The domestic NX curve will _____ and the IS curve will _____:
(A) shift up; shift down
(B) shift up; shift up
(C) shift down; shift up
(D) shift down; shift down.

19. In a fixed-exchange rate economy, if the central bank wants to maintain an overvalued currency it must
(A) restrict international trade and finance markets.
(B) sell official reserves in exchange for the domestic currency.

(C) it cannot maintain an overvalued currency.

(D) all of the above.

20. Which of the following statements is true?

(A) A fixed-exchange rate system can have both international trade and independent monetary policy.

(B) A fixed-exchange rate system is unsustainable if the central bank uses monetary policy.

(C) A fixed-exchange rate system can have either free international trade or independent monetary policy.

(D) A fixed-exchange rate system can have free international trade but cannot have free financial markets.

21. In a Keynesian model, a decrease in the Canadian money supply would cause the value of the Canadian dollar to _____ and net Canadian exports to _____ in the short run:

(A) fall; fall

(B) rise; fall

(C) fall; rise

(D) rise; rise.

22. The Keynesian theory of nominal wage rigidity predicts that in the short-run

(A) the real wage is acyclical.

(B) the real wage is constant.

(C) the real wage is procyclical.

(D) the real wage is countercyclical.

Section B (LONG QUESTIONS): Answer **ALL THREE** questions.

Problem 2. (26 points): The five parts have roughly the same number of points.

Consider the following augmented version of the Solow (neoclassical) growth model. Suppose that the relationship between output per worker, y, physical capital per worker, k, and human capital per worker, h, at any point in time is represented by $y = Af(k, h)$. The function f is increasing in k and h, and has diminishing marginal product of k. Suppose that A and h are exogenous constants, population growth is $n > 0$, the savings rate is s, and the rate of depreciation of capital is $d > 0$.

(1) Explain intuitively why the dynamic evolution of k is described by the equation

$$\Delta k = sAf(k, h) - (n + d)k.$$

(2) With the aid of a diagram, explain how the steady state capital stock per worker, k^*, is determined. If the initial value of k is $k_0 < k^*$, illustrate and explain the process by which the economy converges to the steady state.

(3) Illustrate on a diagram the impact of an increase in the stock of human capital per worker, h, on the steady-state level of output per worker. Describe how the economy adjusts from its original steady state to the new steady state.

(4) Consider two countries that have the same production function

$$y = A\, k^{\frac{1}{2}} h^{\frac{1}{2}}$$

and equal values of $A = 1$, $s = 0.2$, $n = 0.02$ and $d = 0.08$. If country 2 has twice the human capital per worker of country 1, analyze what this implies for the two countries' relative per worker outputs in steady state.

(5) Explain the idea of conditional convergence that is predicted by the Solow model. Explain why this prediction need not be inconsistent with the overall pattern of divergence in the distribution of relative per capita income observed in the real world.

Problem 3. (26 points): Closed economy IS-LM-FE.

The following four equations describe a closed economy:

$C^d = 19 + 0.5\,(Y - T) - 100\,r$ Desired consumption

$I^d = 27 - 50\,r$ Desired investment

$Y = C^d + I^d + G$ Goods market equilibrium

$\frac{M}{P} = 9 + 0.6\,Y - 150\,r$ Money market equilibrium

In the above, Y is real output, T is total taxes, G is government spending, r is the real rate of interest, and P is the aggregate price level. Note that in the final equation, M is the money supply (which is under the control of the central bank) and it is set equal to the demand for money. You should also note that the interest-rate coefficients on consumption and investment sum to 150, which is equal to the interest-rate coefficient on the money demand equation. This will make deriving the AD curve somewhat less burdensome.

(1) Find the IS and LM curves for the economy, in each case with the real interest rate on the left-hand side. Derive as well an equation for the aggregate demand, AD, curve, with Y on the left-hand side.

(2) Suppose that $G = 20$, $M/P = 60$ and that the government is running a budgetary surplus of 5. Given this information, find the level of real output, Y , using the AD curve for this economy. Given the level of real output (Y) that you found, use the equation for your LM curve to solve for the real rate of interest, r. You are to assume that the values of Y and r that you found are the long-run equilibrium values for this economy. As well, assume that the price level is 1, implying that the nominal money supply is 60.

(3) Because of innovations in the financial system, the public is able to economize on its holdings for money balances. In your model, this is reflected as a shift down in the demand for real money balances and is captured by having the constant term in the money demand equation decline from 9 to 7. Initially the central bank holds the money supply constant at 60. Use again your AD curve to find the new level of output. [Hint: In this short-run equilibrium, hold the price level, P, constant.]

(4) Using the diagrams familiar to you from class and the course, describe what is happening. Be sure to compare the new level of output you found with that you found in part (2). Based on this comparison, what are the *implications* for the price level.

(5) Now rewrite your AD curve, with the price level, P, on the left-hand side. Suppose that the economy is now back in equilibrium, with $Y = \bar{Y}$, where $\bar{Y}$ is equal to the level you found in part (2). What has happened to the price level? What process is being illustrated?

(6) Suppose now that the central bank is worried about the inflationary implications of the shift in the money demand equation. What would be the implications for the money supply supposing that the central bank wanted to keep the price level unchanged at the level in part (2)?

Problem 4. (26 points): Open economy IS-LM-FE.

Keeping the equations for C^d, I^d, and $\frac{M}{P}$ the same as in Problem 3 above, suppose that this economy becomes open to trade. To capture this development, an equation for net exports, NX^d, has been added. The final equation is the definition of the real exchange rate, e. Note that the country is small and takes the world real rate of interest, r^w, as given.

$C^d = 19 + 0.5\,(Y - T) - 100\,r^w$ Desired consumption

$I^d = 27 - 50\,r^w$ Desired investment

$Y = C^d + I^d + G + NX^d$ Goods market equilibrium

$NX^d = 21.5 - 0.1\,Y - 4\,e$ Desired net exports

$\frac{M}{P} = 9 + 0.6\,Y - 150\,r^w$ Money market equilibrium

$e = \frac{e_{nom}P}{P_{For}}$ Real exchange rate

(1) Use the above equations to write out the IS and LM curves for this economy, with r^w on the left-hand side.

(2) Suppose that the world interest rate is 4% and that the real money supply is 66. Find the level of real output, Y.

(3) The economy is specialized in certain goods and services and, as a result, it has a surplus of 5; that is, $NX^d = 5$. Find the level of the real exchange rate, e. If the price level (P) in this economy were equal to the foreign price level (P_{For}), what would be the level of the nominal exchange rate, e_{nom}?

(4) Assume that the nominal exchange rate is fixed at the level you found in part (3). As well assume that $G = 20$ and $T = 25$. Now suppose that the economy is hit with a 25% tariff, which in effect will raise the domestic price level, P, by that amount. What is the new level of the real exchange rate?

(5) Now find the new, short-run level of output, assuming that the nominal exchange rate is unchanged. To do this, you will have to use your IS curve, but now with output, Y, on the right-hand side. In percentage terms, by how much has output changed?

(6) Use the diagrams for the IS, LM and FE model to describe what would happen in the long run to output, the domestic price level and the nominal and real exchange rate assuming in turn that the economy has fixed and then flexible exchange rates. Note that no math is required for this part.