Department of Economics
Queen's University

ECON 222: Macroeconomic Theory I
Fall 2019

Sections 001 and 002
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Final Exam
7:00 - 10:00 pm, Tuesday December 10, 2019

This exam is 180 minutes long. Budget your time carefully. Hand calculators (non programmable) are permitted for this exam. The exam consists of three sections with a total of 100 marks allocated:

Section A consists of multiple choice questions. You should answer all 25 of them. Each question is worth 1 mark for a total of 25 marks. A multiple choice answer card is provided for your answers. Please complete this answer card correctly using a soft lead HB pencil as described over the page.

Section B consists of a **MANDATORY** long question. It is worth 35 marks. Please read all the questions carefully. You are encouraged to draw diagrams to support your answers where appropriate. Please label the axis and lines or curves on your diagrams. Marks will be awarded on the basis of the logical arguments given to support your answers.

Section C consists of three long questions. You only need to do **TWO** (2) of the three questions. Each question is worth 20 marks for a total of 40 marks. Please read all the questions carefully. You are encouraged to draw diagrams to support your answers where appropriate. Please label the axis and lines or curves on your diagrams. Marks will be awarded on the basis of the logical arguments given to support your answers.

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

Upon completion of your exam, you MUST hand in the following three items:
The multiple choice card, completed correctly,
The answer booklet clearly labelled with your student number and class section,
This exam question paper.

Section A MULTIPLE CHOICE [25 marks]: Answer ALL of the following questions. Choose the ONE alternative that best completes the statement or answers the question.

1. The business cycle describes the
A) progression of an industry's structure from monopoly to perfect competition.
B) progression of an industry's structure from perfect competition to monopoly.
C) expansion and contraction of an individual industry within the economy.
D) expansion and contraction of economic activity in the economy as a whole.

2. John Maynard Keynes disagreed with the classical economists because he assumed that
A) wages and prices adjusted slowly.
B) international trade played a major role in the macroeconomy.
C) government intervention in the economy could not reduce business cycles.
D) unemployment would be eliminated quickly by the invisible hand of the market.

3. Intermediate goods are
A) capital goods, which are used up in the production of other goods but were produced in earlier periods.
B) final goods that remain in inventories.
C) goods that are used up in the production of other goods in the same period that they were produced.
D) either capital goods or inventories.

4. The principle of diminishing marginal productivity of capital implies that
A) output will diminish as capital increases.
B) output will increase first, but it will decrease as capital increases.
C) output will increase at diminishing rate as capital increases.
D) output will decrease first, but it will increase as capital increases.

5. An increase in expected future output while holding today's output constant would
A) increase today's desired consumption and increase desired national saving.
B) increase today's desired consumption and decrease desired national saving.
C) decrease today's desired consumption and increase desired national saving.
D) decrease today's desired consumption and decrease desired national saving.

6. If a Canadian firm buys stereos from a Japanese firm and the Japanese firm uses the dollars it gets to buy Canadian Treasury bonds, what items are recorded in the Canadian balance of payments accounts?
A) credit the trade account; credit the capital account
B) credit the trade account; debit the capital account
C) debit the trade account; debit the capital account
D) debit the trade account; credit the capital account

7. The elasticity of output with respect to capital
A) is the increase in output resulting from an increase in the capital stock.
B) is the percentage increase in output resulting from a one percent increase in the capital stock.
C) is always greater than one.
D) is the inverse of the elasticity of output with respect to labour.

8. Suppose you read in the paper that the Central Bank of Canada plans to expand the money supply. The Central Bank is most likely to do this by
A) printing more currency and distributing it.
B) purchasing government bonds from the public.
C) selling government bonds to the public.
D) buying newly issued government bonds directly from the government itself.

9. The low point in the business cycle is referred to as the
A) contraction.
B) recession.
C) trough.
D) depression.

10. You have just read that the Bank of Canada has increased the money supply to avoid a recession. For a given price level, you would expect the LM curve to
A) shift up as the real money supply falls.
B) shift up as the real money supply rises.
C) shift down as the real money supply falls.
D) shift down as the real money supply rises.

11. Suppose the French franc rises against the British pound but falls against the German mark. What happens to the prices of goods imported into France?
A) Both British and German goods fall in price.
B) Both British and German goods rise in price.
C) British goods rise in price while German goods fall in price.
D) British goods fall in price while German goods rise in price.

12. Over the past year, output grew 6%, capital grew 2%, and labour grew 4%. If the elasticities of output with respect to capital and labour are 0.3 and 0.7 respectively, how much did productivity grow?
A) 2.0%
B) 2.6%
C) 3.0%
D) 3.3%

13. The measurement of GDP includes
A) nonmarket goods such as homemaking and child-rearing
B) the benefits of clean air and water
C) estimated values of activity in the underground economy
D) purchases and sales of goods produced in previous periods

14. On January 1, 2001, the GDP deflator for Old York was 300, and on January 1, 2003, the GDP deflator had risen to 330.75. Based on this information, the annual average inflation rate for the two years was
A) 5%
B) 5.125%
C) 10%
D) 10.25%

15. In 2001 your firm's capital stock equaled $10 million, and in 2002 it equalled $15 million. The average depreciation rate on your capital stock is 20%. Gross investment in 2002 equaled
A) $3 million
B) $4 million
C) $5 million
D) $7 million

16. When a person receives an increase in wealth, what is likely to happen to consumption and saving?
A) consumption increases and saving increases
B) consumption increases and saving decreases
C) consumption decreases and saving increases
D) consumption decreases and saving decreases

17. A temporary increase in government purchases, given the level of output, will lead to
A) a higher desired consumption and a higher desired national saving
B) a lower desired consumption and a lower desired national saving
C) a higher desired consumption and a lower desired national saving
D) a lower desired consumption and a higher desired national saving

18. You have just purchased a new VCR to show videos to your customers. The VCR cost $500, and you depreciate the machine at a rate of 25% each year. You can borrow money from the bank at 10%, or receive 6% for depositing money at the bank. The expected inflation rate in the coming year is 5%. You used the company's own funds to purchase the VCR. The firm's user cost of capital for the first year is
A) $130
B) $150
C) $155
D) $175

19. Which of the following would be part of the nation's capital account?
A) a nightclub show seen by a Canadian in Mexico City
B) a dividend from a British equity owned by a Canadian
C) a payment to the Philippine government for the use of military bases in their country
D) one hundred shares of British Petroleum stock purchased by a Canadian

20. If Canada acquired net foreign assets of $50 billion in one year, this would be the equivalent of
A) net imports of $50 billion
B) net foreign borrowing of $50 billion
C) a capital account deficit of $50 billion
D) a current account deficit of $50 billion

21. Suppose velocity is 3, real output is 6000, and the price level is 20. What is the level of real money demand in this economy?
A) 100
B) 2,000
C) 40,000
D) 120,000

22. If the interest elasticity of money demand is $-\frac{1}{4}$, by what percent does money demand rise if the nominal interest rate rises from 4% to 5%?
A) 6.25%
B) 0.25%
C) -0.25%
D) -6.25%

23. People have reduced their expectations of inflation from 5% to 3%, directly causing
A) a relative increase in real money demand, shifting the LM curve up
B) a relative decrease in real money demand, shifting the LM curve down
C) a relative increase in real money demand, shifting the LM curve down
D) a relative decrease in real money demand, shifting the LM curve up

24. If there is an increase in taxes on business firms in a small open economy, it causes the current account to — and saving —
A) fall; fall
B) rise; remain unchanged
C) fall; remain unchanged
D) rise; fall

25. If business taxes rise in a large open economy, it causes the current account to — and saving to —
A) fall; fall
B) rise; remain unchanged
C) fall; remain unchanged
D) rise; fall

Section B MANDATORY LONG QUESTION [35 marks]

The production function in an economy is

$$Y = A(2N - 0.005N^2)$$

where A is productivity. With this production function, the marginal product of labour is

$$MPN = 2A - 0.01AN.$$

Suppose that A = 4. The labour supply curve is

$$NS = 55 + 10(1 - t)w,$$

where NS is the amount of labour supplied, w is the real wage, and t is the tax rate, which is 0.5.

Desired consumption and investment are

$$\begin{aligned} C^d &= 200 + 0.8(Y - T) - 150r; \\ I^d &= 200 - 200r. \end{aligned}$$

Taxes and government purchases are

$$\begin{aligned} T &= 10 + 0.25Y; \\ G &= 50. \end{aligned}$$

Money demand is

$$\frac{M^d}{P} = 0.4Y - 200(r + \pi^e)$$

The expected rate of inflation π^e is 0.01, and the nominal money supply M is 1000.

a. Find an equation that describes the IS curve in the following format: $r = f(Y)$.

b. Find an equation that describes the LM curve in the following format: $r = g(Y, P)$

c. Using the IS curve and the LM curve find an equation that describes the aggregate demand (AD) curve in the following format: $P = h(Y)$

d. What is the value of output at the FE line?

e. Calculate the real interest rate, the investment level, the consumption level and the price level at the general equilibrium point. Graph the general equilibrium.

f. Suppose there is a decrease in G. Explain what will happen to the economy (short-run and long-run) as well as to the aggregate demand curve (short-run only). Use graphs to support your explanation.

g. Suppose the central bank can perfectly predict the consequences of the shock described in part f and can react immediately when it occurs. What should it do to achieve its objective of price stability?

Section C LONG QUESTIONS [40 marks]: Answer any TWO (2) of the following three questions. Each question is worth 20 marks.

C1. Consider the following version of the neoclassical (Solow) growth model. Suppose the relationship between output and productive inputs at any point in time is represented by

$$Y = AK^{0.5}N^{0.5},$$

Suppose also that population growth is n, the savings rate is s, and the rate of depreciation of capital is d.

a. Express the production in per worker terms by letting $y = \frac{Y}{N}$ and $k = \frac{K}{N}$.

b. Derive the dynamics of capital per worker. Derive an expression for the steady-state capital stock per worker, k^*, and an expression for the steady-state output per worker, y^*. Illustrate the steady-state for this economy on a diagram.

c. Now suppose there are two countries (A and B), that are identical in all respects except that country A has a higher savings rate than B: $s_A > s_B$. Explain using a diagram what this implies for the relative steady-state levels of capital per worker in each country.

One shortcoming of the neoclassical growth model is that the model assumes rather than explains the productivity growth and hence the growth rate of output. In response to this shortcoming, endogenous growth theory has been developed to explain productivity growth. Now suppose we augment the neoclassical model with human capital and output is given by $Y = AK^{0.5}(hN)^{0.5}$. Suppose also that population growth is n, the savings rate is s, and the rate of depreciation of capital is d.

d. Express the production in per worker terms. Derive the dynamics of capital per worker and an expression for the steady-state capital stock per worker, k^*, as a function of human capital per worker h.

e. Consider now the two countrie (A and B) have the same production function augumented with human capital and equal values of A, s, n and d. Besides in both countries physical capital per worker is proportional to human capital per worker, $k = Bh$. If country A has twice the human capital h_A of country B h_B, what does this imply for their relative per worker outputs in steady-state?

C2. Suppose a country that uses a fixed exchange rate system asks your advice and your knowledge on the use of a fixed exchange rate system. Denote their official rate as $\bar{e}_{nom}$ and the fundamental value of the nominal exchange rate e^*_{nom}.

a. Suppose the output of that country decreases. How is that affecting the currency market? Use a graph to support your explanation. Assume that the official rate is higher than the fundamental value of nominal exchange rate.

b. Suppose there is an increase in the quality of goods produced in a foreign country. How is this improvement affecting the domestic currency market? Use a graph to support your explanation. Assume that the official rate is higher than the fundamental value of nominal exchange rate.

c. Suppose there is a decrease in money supply. How is the decrease affecting the economy based on the IS-LM-FE model? Use graphs to support your explanation. What can you conclude about the use of monetary policy as a way to stabilize the economy in this context? Assume that the domestic interest rate is initially equal to the foreign interest rate. -

d. Suppose the government decides to decrease its spending. How is this fall affecting the economy based on the IS-LM-FE model? Use graphs to support your explanation. What can you conclude on the use of fiscal policy as a way to adjust macroeconomic variables? Assume that the domestic interest rate is initially equal to the foreign interest rate.

C3. Suppose a Canadian resident wants to purchase a $100,000 asset. This citizen is interested in investing in either the government bond from the United States of America or the government bond from France. Both investments last two years. Before making the investment, the Canadian investor collected the information for several countries:

Country	Amount of currency	Annual interest rate
U.S.A	110	3%
France	100	2%
Japan	12,000	5%
Canada	147	4%

a. Given that the investor is interested in only two bonds and given its following expected nominal exchange rates:

Country	Expected nominal exchange rate in two years
U.S.A	0.719
France	0.625
Japan	93.75
Canada	1.00

Calculate the expected gross nominal rate of return for both bonds. Which one will the investor choose?

b. Assume that the interest rate parity holds between the two bonds. Which bond would the investor prefer?

c. Suppose that the cost of a coffee in France is 1 euro and that the same coffee costs $1.50 in Canada. Calculate the real exchange rate. What can you say about its value?

d. Assume that the purchasing power parity hypothesis holds. What would be the real exchange rate?

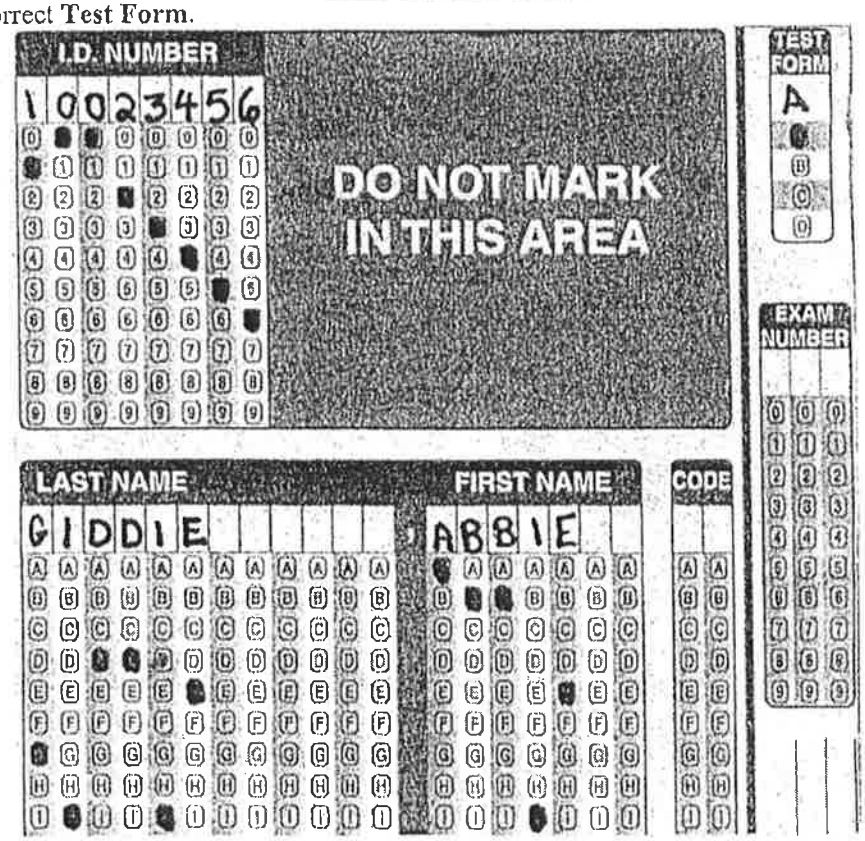
e. Suppose that instead of dealing with levels, someone is interested in percentage change. Write down the equation (without assuming the PPP hypothesis and without values). What is the relative purchasing power parity hypothesis? How different is the equation if the hypothesis holds?

f. Show why the relative purchasing power parity hypothesis is a weaker implication than the purchasing power parity hypothesis.

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**.



ECON 222 Cheat Sheet

Notation:

Y = gross domestic product; C = household consumption expenditures
I = total investment; G = government consumption expenditure; NX = net exports
S = national saving; NFP = net factor payments from abroad
CA = current acccount balance; KA = capital and financial acccount balance
MPK^f = expected future marginal product of capital; uc = user cost of capital
i = domestic nominal interest rate; i_{For} = foreign nominal interest rate
r = real interest rate; A = total factor productivity
d = rate of depreciation of physical capital; p_k = unit price of capital good
τ = effective tax rate on capital income
s = savings rate; n = population growth rate; k = capital stock per worker
e = real exchange rate; e_n = nominal exchange rate
M = stock of monetary assets; V = velocity of money
P = domestic price level; P_{For} = foreign price level

Identities and equilibrium conditions:

$$Y = C + I + G + NX$$

$$S = Y + NFP - C - G$$

$$CA = NX + NFP$$

$$CA + KA = 0$$

$$uc = (r + d)p_k$$

$$MPK^f = \frac{uc}{1 - \tau}$$

$$\frac{\Delta A}{A} = \frac{\Delta Y}{Y} - \alpha_K \frac{\Delta K}{K} - \alpha_N \frac{\Delta N}{N}$$

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

$$\frac{M}{P} = \frac{M^d}{P} = L(y, i)$$

$$V = PY/M$$

$$e = \frac{e_n P}{P_{For}}$$

$$i = i_{For} - \frac{\Delta e_n}{e_n}$$