QUEEN'S UNIVERSITY FINAL EXAMINATION
FACULTY OF ARTS AND SCIENCE
DEPARTMENT OF ECONOMICS

ECON 222 001-002 – Professors: Mohsen Bakhshi-Moghaddam and Bill Dorval
December 12, 2022

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 20 of them. Each question is worth 1 mark for a total of 20 marks. Section B consists of 4 long questions. Each question is worth 20 marks for a total of 80 marks. You should answer all the long questions. 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 aids are allowed:
Casio FX-991 calculator

Put your student number on all pages of all answer booklets, including the front.
GOOD LUCK!

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

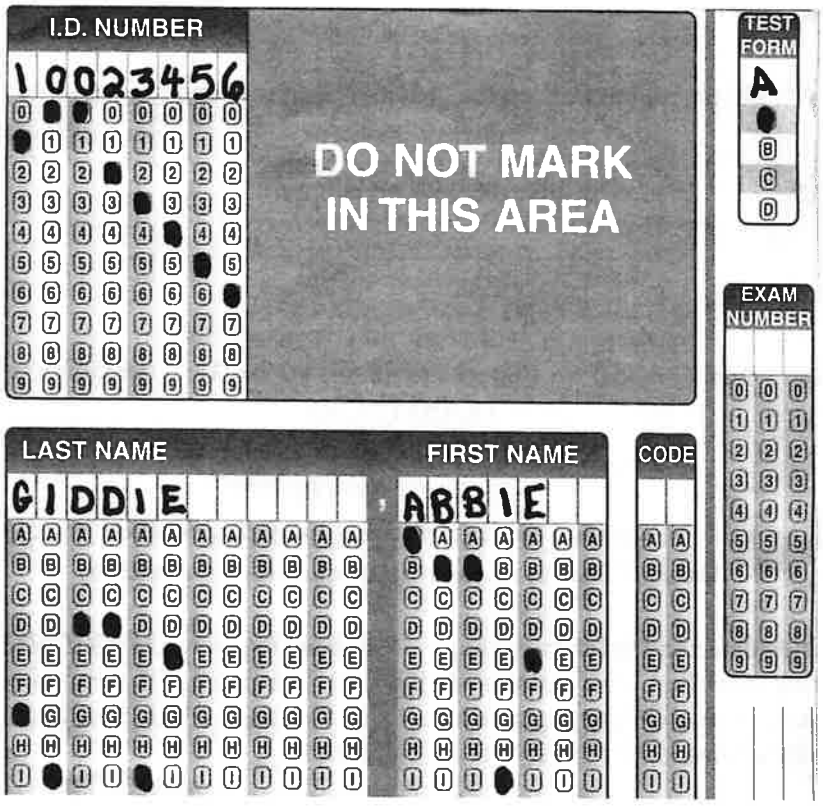
Multiple-Choice Instructions. Multiple-choice answers on the answer sheet are marked by an optical scanner. It reads only what is in the rectangle. Fill it in completely and stay within its limits. **You must use a soft lead (e.g. "HB") pencil to fill in the Answer Sheet.** Remember, if you need to change your answer, COMPLETELY ERASE IT, and correct it. 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 the Exam:

1. Write your Student # under "**I.D. 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. (If your name is too long to fit in the spaces provided, please enter as many letters as you can.) **See example below.**

3. Under "**Test Form**", fill in "**A**". **See example below.**



Part A (MULTIPLE CHOICE): Answer ALL the following questions. Choose the <u>one</u> alternative that best completes the statement or answers the question.

1) The country of Old Jersey produces milk and butter, and it has published the following macroeconomic data, where quantities are in gallons and prices are dollars per gallon:

	2000		2001	
Good	Quantity	Price	Quantity	Price
Milk	500	$2	900	$3
Butter	2000	$1	3000	$2

What is the growth rate of real GDP between 2000 and 2001?
A) 37.5%
B) 60%
C) 83%
D) 190%

2) You are trying to figure out how much capacity to add to your factory. You will increase capacity as long as
A) the expected marginal product of capital is positive.
B) the expected marginal product of capital is greater than or equal to the marginal product of capital.
C) the expected marginal product of capital is greater than or equal to the expected marginal product of labour.
D) the expected marginal product of capital is greater than or equal to the user cost of capital.

3) If the government cuts taxes today, issuing debt today and repaying the debt plus interest next year, a rational taxpayer will
A) spend the full amount of the tax cut today and reduce consumption next year.
B) increase consumption today, before taxes go up next year.
C) increase saving today, leaving consumption unchanged.
D) leave a smaller gross bequest to her or his heirs.

4) The uses-of-saving identity shows that if the government budget deficit rises, then which of the following must happen?
A) Private saving must rise, investment must fall, and/or the current account must fall.
B) Private saving must rise, investment must fall, and/or the current account must rise.
C) Private saving must rise, investment must rise, and/or the current account must fall.
D) Private saving must rise, investment must rise, and/or the current account must rise.

5) 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%

6) The full-employment (*FE*) line shifts left if
A) labour supply declines.
B) productivity decreases.
C) there is an adverse supply shock.
D) all of the above.

7) Which of the following statements is *true*?
A) GDP calculated by income approach is greater than GDP calculated by expenditure approach.
B) GDP calculated by product approach is greater than GDP calculated by expenditure approach.
C) GDP calculated by expenditure approach is greater than GDP calculated by product approach.
D) All three approaches for calculating GDP will result in the same value for GDP.

8) Sweetland economy's GDP is $2000 billion, desired consumption spending is $1200 billion, desired investment spending is $500 billion, and government purchases $400 billion. The Sweetland economy's absorption is
A) $2000 billion.
B) $1200 billion.
C) $2100 billion.
D) -$100 billion.

9) Under a system of fixed exchange rates, what happens if a country's currency is undervalued?
A) The Central Bank loses official reserve assets.
B) The Central Bank gains official reserve assets.
C) The currency depreciates.
D) The exchange rate falls.

10) A favourable supply shock would
A) shift the production function up and decrease marginal products at every level of employment.
B) shift the production function down and decrease marginal products at every level of employment.
C) shift the production function down and increase marginal products at every level of employment.
D) shift the production function up and increase marginal products at every level of employment.

11) The endogenous growth model implies that
A) marginal productivity of capital is diminishing.
B) human capital increases with the accumulation of physical capital.
C) the standard of living in all countries will converge in the long-run.
D) the marginal productivity of capital is increasing.

12) The principle of diminishing marginal productivity of labour implies that
A) output diminishes as labour increases.
B) output will decrease first, but it will increase as labour increases.
C) output increases at a diminishing rate as labour increases.
D) output will increase first, but it will decrease as labour increases.

13) Which of the following best describes the classical and the Keynesian views on the monetary neutrality?
A) Classical economists believe that money is neutral, but Keynesians do not.
B) Both classical and Keynesian economists believe in monetary neutrality, but they differ in the speed of price adjustment.
C) Classical economists believe in slow adjustment of prices, but Keynesians argue that price adjustment does not take long.
D) Keynesians believe that money affects employment and output in short run and long run, but classical economists argue that money is neutral only in the long run.

14) A small open economy increases its investment demand. This causes the world real interest rate to _____ and the country's current account balance to _____.
A) rise; fall
B) remain unchanged; rise
C) rise; rise
D) remain unchanged; fall

15) An increase in the real wage will cause an individual to increase his or her supply of labour if
A) the substitution effect is greater than the income effect.
B) the income effect is greater than the substitution effect.
C) the substitution effect is equal to the income effect.
D) the substitution effect is negative and the income effect is positive.

16) The main difference between the small open economy and the large open economy is that
A) the former faces a fixed international real interest rate, but the latter can influence it.
B) the former can influence the international real interest rate, but the latter cannot.
C) the former cannot maintain a large current account deficit, but the latter can.
D) the former can maintain a large current account deficit, but the latter cannot.

17) Which of the following changes would lead to a higher living standard?
A) a higher saving rate, higher population rate, and higher productivity
B) a lower saving rate, higher population rate, and higher productivity
C) a lower saving rate, lower population rate, and higher productivity
D) a higher saving rate, lower population rate, and higher productivity

18) In an open economy, an increase in net exports because of increased demand for domestic products by foreigners should cause the domestic real interest rate to _____ and should cause desired saving minus desired investment to _____.
A) rise; rise
B) rise; fall
C) fall; rise
D) fall; fall

19) When there are two large open economies, if desired international lending by the domestic country exceeds desired international borrowing by the foreign country, then
A) domestic saving must rise.
B) domestic saving must fall.
C) the world real interest rate must fall.
D) the world real interest rate must rise.

20) If all countries produce the same good (or the same set of goods) and goods are freely traded among countries, so that the real exchange rate equals one, then the relationship between domestic and foreign prices and the nominal exchange rate is
A) $P = P_{For} / e_{nom}$.
B) $P = e_{nom} \times P_{For}$.
C) $e_{nom} = P \times P_{For}$.
D) $P = P_{For}$.

Part B (Long Questions):

B1. The Neoclassical growth model (20 marks)

Consider an economy with the following aggregate production function:

$$Y_t = A_t K_t^{\alpha} N_t^{1-\alpha}$$

where Y_t is aggregate output, A_t represents total factor productivity, K_t is the aggregate capital stock, and N_t is the number of workers in the economy. The labour force grows at rate n, capital depreciates at rate d, and the households save a constant fraction s of their income.

a) Let $y_t = \frac{Y_t}{N_t}$ and $k_t = \frac{K_t}{N_t}$. Derive the intensive form of the production function in per worker terms. Show your steps.

b) Derive an algebraic expression for the level of investment per worker and saving per worker in a steady-state equilibrium. Also, find the expression for the capital-labour ratio in the steady state. With the aid of the diagram, show that this equilibrium point is stable. Briefly explain your reasoning.

c) Use the diagram showing the steady-state capital-labour ratio for this economy to explain and illustrate the effect of a rise in the capital depreciation rate. Briefly explain what happens to the capital-labour ratio, investment per worker, output per worker and consumption per worker.

d) Derive an algebraic expression for the Golden Rule level of capital per worker, k_G. For what saving rate (s) will the steady-state level of capital per worker equal the Golden Rule level of capital per worker?

B2. Asset market equilibrium (20 marks)

Assume the real money demand function is

$$L(Y, i) = 2000 + 0.3Y - 5000i$$

where Y is real output, P is the price level, i is the nominal interest rate on non-monetary assets, and monetary assets earn no interest.

a) Assuming that the asset market is in equilibrium at $i = 0.05$. Find the equilibrium levels of the real money supply, M/P, the nominal money supply, M, and the velocity of money, V, if $P = 100$, and $Y = 2000$. (Note: please round your answers to the nearest three decimal places for all parts of this question.)

b) Find the real income elasticity of money demand at the equilibrium level of money balances found in part a).

c) The rate of inflation in this economy is defined as the growth rate of the nominal money supply minus an adjustment for the growth rate of real money demand arising from growth in the real output:

$$\pi = \frac{\Delta M}{M} - \eta_y \frac{\Delta Y}{Y}$$

Assume that real income is expected to grow by 5% over the next year, the interest rate remains constant, and the income elasticity of real money demand equals the value found in part b). Find out how much the central bank should increase the nominal money supply if it pursues an inflation target of zero inflation for the next year. Also, find the new level of nominal money supply in this economy.

d) Does the quantity theory of money hold in this economy? State your reason by considering the new level of nominal money supply in part c) and given that $P = 100$, and $Y = 2000$.

B3. The closed economy IS-LM-FE model (20 marks)

A closed economy is described by the following equations:

$$C^d = 100 + 0.5(Y - T) - 500r$$
$$I^d = 300 - 400r$$
$$\frac{M^d}{P} = 10 + 0.5Y - 900(r + \pi^e)$$

where Y is real output, P is the price level, r is the real interest rate, π^e, is inflation expectations, T is a lump-sum tax, C^d, is desired consumption, I^d is desired investment, and M is the nominal supply of money which is set by the central bank.

a) Derive an algebraic expression for the IS and LM curves with the real interest rate, r, on the left-hand side of the equation. Find also the AD curve, with real output, Y, on the left-hand side.

b) Assume the expected inflation rate, π^e, is 2%, the real money supply, M/P, is 100, the price level, P, is 1, government spending, G, is 100, and the government budget is balanced. Using your results from part a), find the full employment level of output, $\bar{Y}$, and the real interest rate, r.

c) Now, suppose consumers and business owners' confidence weakened. In other words, consumers and business owners are not optimistic about the future of the economy. The change in behaviour from

consumers and business owners is represented by a change in the constants of the desired consumption and desired investment equations. Altogether, the constants change by 18. Find real output, Y_{SR}, and the real interest real, r_{SR}, in the Keynesian short-run equilibrium. Using a graph of the IS-LM-FE framework, show and explain the transition from the initial equilibrium (part b)) to the short-run equilibrium, and the return to the long-run equilibrium. Make sure to label your axes and curves and indicate clearly the shift of the curves. *[Note: The constants of the two equations are added together when the IS curve is built. Therefore it does not matter how the 18 is added or subtracted from the desired consumption and desired investment equations.]*

d) The authorities are aware of this lack of optimism in the economy, via the *Consumer Confidence Survey* and the *Business Outlook Survey*, and fear it will lead to a recession. They decide to act to keep output at its full employment level, $\bar{Y}$.

i. The government could use its fiscal policy (G and T). Calculate the change required in G and in T (two different cases). *[Hint: Look at the IS curve or AD curve].*

ii. Instead, the central bank could use its monetary policy (M). Calculate the required change in M.

B4. The open economy IS-LM-FE model (20 marks)

A small open economy is described by the following equations:

$$C^d = 600 + 0.5(Y - T) - 600r$$

$$I^d = 400 - 400r$$

$$NX = 600 - 0.25Y - 50e$$

$$\frac{M^d}{P} = 0.5Y - 1000(r + \pi^e)$$

where Y is real output, P is the price level, r is the real interest rate, e, is the real exchange rate, π^e, is inflation expectations, T is a lump-sum tax, C^d, is desired consumption, I^d is desired investment, NX is net export, and M is the nominal supply of money which is set by the central bank.

a) Derive an algebraic expression for the IS and LM curves with the real interest rate, r, on the left-hand side of the equation. Find also the AD curve, with real output, Y, on the left-hand side.

b) Assume the expected inflation rate, π^e, is 5%, the real interest rate, r, is 3%, the real money supply, M/P, is 1000, the domestic and foreign price level, P and P_{for}, are 1, government spending, G, is 300, and the government budget is balanced. Using your results from part a), find the full employment level of output, $\bar{Y}$, and the real exchange rate, e.

c) Assume this economy has a flexible exchange rate regime. The central bank decides to decrease the nominal money supply to 950. Find real output, Y_{SR}, and the real exchange rate, e_{SR}, in the Keynesian short-run equilibrium.

d) Using the open economy IS-LM-FE framework, show and explain the initial equilibrium, the short-run equilibrium, and the return to the long-run equilibrium. What would have happened instead if it was a fixed exchange rate regime?