SOLUTIONS

ECO 209Y – L0101
MACROECONOMIC THEORY

Term Test #1

LAST NAME _____

FIRST NAME _____

STUDENT NUMBER _____

INSTRUCTIONS:

1. The total time for this test is 1 hour and 50 minutes.
2. Aids allowed: a simple calculator.
3. Use pen instead of pencil.

DO NOT WRITE IN THIS SPACE

Part I	_____	/25
Part II	_____	/15
Part III 1.	_____	/10
2.	_____	/10
3.	_____	/10
4.	_____	/10
TOTAL	_____	/80

PART I   (25 marks)

Instructions: Enter your answer to each question in the table below. Only the answer recorded in the table will be marked. Table cells left blank will receive a zero mark for that question. Each question is worth 2.5 marks. No deductions will be made for incorrect answers.

1	2	3	4	5	6	7	8	9	10
B	B	D	D	E	D	C	C	D	C

1. Which one of the following expenses is not considered as part of investment expenditure when measuring GDP?
    A) The construction of a patio in John's backyard by a private constructor.
    B) Air Canada buys CanJet Airlines for $500 million.
    C) A new limousine bought for the use of the chairman of BMO.
    D) An extension to Ontario's private highway 407.
    E) All of the above are part of investment when measuring GDP.

2. Suppose that an economy produces only apples, bananas, and oranges, and that prices (in dollars) and quantities (in pounds) are as shown in the following table:

Good	Year 2005		Year 2010	
	Quantity	Price	Quantity	Price
Apples	2,000	$2	3,000	$3
Bananas	4,000	$3	6,000	$2
Oranges	6,000	$4	8,000	$5

Considering the year 2005 as the base year, the percentage increase in real GDP between 2005 and 2010 is
    A) 52.5 percent.
    B) 40.0 percent.
    C) 38.6 percent.
    D) 30.0 percent.
    E) None of the above is correct.

3. Touchwood Co. produced 10,000 wooden chairs in 2010. The company sold the full production by December 31, 2010 at a price of $130 a piece and made a total profit of $200,000. To produce these chairs, Touchwood had to pay wages of $500,000, interest of 50,000 to the TD Bank, $100,000 in indirect taxes, $50,000 in corporate income taxes, and $400,000 to the River Miller Co. for the wood needed for the chairs. The depreciation of the company's capital stock was $50,000 in 2010. That year's Touchwood's contribution to net domestic income was
    A) $1,300,000.
    B) $900,000.
    C) $1,150,000.
    D) $750,000.
    E) None of the above is correct.

4. Consider a closed economy without depreciation of the capital stock, without government transfer payments, and where personal income tax is the only source of government revenues. If GDP is $980 billion, consumption is $650 billion, private saving is $120 billion, and government purchases are $180 billion, which of the following is true in this economy?
   A) Disposable income is $860.
   B) Investment is $120.
   C) The budget surplus is -$30.
   D) Personal income tax is 210.
   E) None of the above is correct.

5. Consider the AE model of the economy and assume that the marginal propensity to save (MPS$_{YD}$) is 0.2, the marginal income tax rate (t) is 0.25, and the marginal propensity to import (m) is to 0.1. If autonomous saving decreased by $200, which of the following would be true when comparing the new equilibrium to the old one?
   A) GDP would increase by $500.
   B) Total consumption would increase by $240.
   C) Disposable income would increase by $400.
   D) The budget deficit would decrease by $300.
   E) Private savings would decrease by $140.

6. The ultimate objective of the so-called "starve the beast" theory is to
   A) eliminate government deficits.
   B) reduce wasteful expenditures by the government.
   C) improve efficiency in the economy.
   D) minimize the size of the government.
   E) None of the above is correct.

7. Consider the AE model of the economy. If the MPC$_{YD}$ is 0.75, there is a $0.20 tax levied on each dollar of income, and the marginal propensity to import is 0.1, then a $100 increase in government purchases will cause the budget surplus to
   A) decrease by $100.
   B) increase by $60.
   C) decrease by $60.
   D) decrease by $80.
   E) None of the above is correct.

8. Consider a fixed price model of a closed economy, and suppose that consumption demand declines as the interest rate increases. The slope of the IS curve will
   A) be steeper the more sensitive consumption demand is to changes in the interest rate.
   B) be flatter if the interest sensitivity of consumption is greater than the interest sensitivity of investment.
   C) be steeper the less sensitive consumption demand is to changes in the interest rate.
   D) not depend on the sensitivity of consumption demand to changes in the interest rate.
   E) be flatter if the interest sensitivity of investment is greater than the interest sensitivity of consumption.

9. Consider a fixed price model of a closed economy. A decrease in autonomous savings at each level of disposable income will
  A) shift the LM curve down.
  B) shift the LM curve up.
  C) shift the IS curve to the left.
  D) shift the IS curve to the right.
  E) leave both the IS and the LM curves unchanged.

10. Suppose that the money supply increases as the rate of interest rises. Then, all else equal, which of the following will be true?
  A) The IS curve will be steeper than when the money supply is fixed.
  B) Both the IS and the LM curves will be steeper than when the money supply is fixed.
  C) The LM curve will be flatter than when the money supply is fixed.
  D) The IS curve will be steeper and LM curve will be flatter than when the money supply is fixed.
  E) None of the above is correct.

PART II   (15 marks)

Consider the following model of the economy:

$C = 50 + 0.8YD$
$I = 150 + 0.1Y$
$G = 150$
$TR = 50$
$TA = 50 + 0.2Y$
$X = 100$
$Q = 10 + 0.14Y$
$Y_{fe} = 1200$

a) What is the equation for the AE curve in this model? **(2 marks)** What is the equilibrium level of income? **(2 marks)** What is the aggregate expenditure multiplier in this model? **(2 marks)**

First, let's find the expression for YD:

$YD = Y - TA + TR = Y - 50 - 0.2Y + 50 = 0.8Y$

Second, let's find the expression for C as a function of Y:

$C = 50 + 0.8 (0.8Y) = 50 + 0.64Y$

And now let's find the expression for AE:

$AE = C + I + G + X - Q = 50 + 0.64Y + 150 + 0.1Y + 150 + 100 - 10 - 0.14Y = 440 + 0.6Y$

To find equilibrium income we must equate Y and AE:

$Y = AE \rightarrow Y = 440 + 0.6Y \rightarrow 0.4Y = 440 \rightarrow Y^* = 1100$

Finally, the expression for the expenditure multiplier is:

$\alpha_{AE} = 1 / (1 - \text{slope of AE curve}) = 1 / (1 - 0.6) = 1 / 0.4 = 2.5$

b) What is the level of private saving (S) when the economy is in equilibrium? What is the level of government saving (or budget surplus, BS) when the economy is in equilibrium? What is the level of national saving (S_N) when the economy is in equilibrium? **(3 marks)**

Since $S = YD - C$, let's find the values of YD and C:

$YD = 0.8Y = 0.8 (1100) = 880$

$C = 50 + 0.8YD = 50 + 0.8 (880) = 754$

Therefore, $S = YD - C = 880 - 754 = $ 126

$BS = TA - (G + TR) = 50 + 0.2 (1100) - (150 + 50) = $ 70

$S_N = S + BS = 126 + 70 = $ 196

c) All else equal, what change in government purchases (G) would be necessary for the economy to reach the level of full-employment income? **(3 marks)** Given this increase in G, what would be the level of government saving (or budget surplus) at the level of full-employment income? **(3 marks)**

Since $Y_{fe} = 1200$, then the required change in Y is $\Delta Y = \alpha_{AE} \Delta G = 100$ and thus the required change in government purchases is $\Delta G = 100 / \alpha_{AE} = 100 / 2.5 = $ 40.

Given $\Delta G = 40$, at $Y = 1200$ the government budget surplus would be:

$BS = TA - G - TR = 50 + 0.2 (1200) - 190 - 50 = $ 50

PART III   (40 marks)

Instructions: Answer the following questions in the space provided. Each question is worth 10 marks.

1. Answer true or false to the following statement: *"An increase in government purchases is more effective in increasing national income when investment is also sensitive to income changes."* (Show your answer algebraically and <u>explain</u> the economics. Consider the AE model of a closed economy.)

This statement is true.

Let's consider a closed economy initially in equilibrium, and let's assume first that investment does not depend on Y (i.e., only C is assumed to depend on the level of Y). What is the impact of this increase in G on equilibrium Y?

An increase in G increases autonomous AE by the same amount and through the multiplying process causes equilibrium income to increase further by the increase in G times the expenditure multiplier, i.e., $\triangle Y = \alpha_{AE} \triangle G$.

Let's look at this multiplying process. The increase in G increases autonomous AE and creates a situation of disequilibrium in the economy where AE > Y. Firms start selling more than they are actually producing and thus they experience an involuntary decrease in inventories. It is this involuntary decrease in inventories that gives the signal to the firms that production must be adjusted upwards, and thus output and income increase. As Y increases, a fraction "c (1 – t)" of any additional dollar of Y is re-spent by consumers in the purchase of goods and services — i.e., the marginal propensity to spend is equal to the MPC_Y — and thus AE increases further and so does Y. In this case, then, the expenditure multiplier is $\alpha_{AE} = 1 / [(1 - c (1 - t)]$.

Let's consider now the case of a closed economy initially in equilibrium, but assuming that consumption and investment both depend on the level of Y. What is the impact of this increase in G on equilibrium Y?

As before, the increase in G increases autonomous AE by the same amount and through the multiplying process causes equilibrium income to increase further by the increase in G times the expenditure multiplier, i.e., $\triangle Y = \alpha_{AE} \triangle G$. This multiplying process is also basically the same as before, except for one important point. As Y increases to eliminate the excess demand in the economy, a fraction "c (1 – t)" of any additional dollar of Y is re-spent by consumers in the purchase of goods and services but now also another fraction "f" (i.e., the marginal propensity to invest) of any additional dollar of Y is re-spent by firms in the purchase of final goods (i.e., on investment) — i.e., the marginal propensity to spend is now equal to the MPC_Y plus the marginal propensity to invest — and thus AE increases further and so does Y. In this case, then, the expenditure multiplier is $\alpha_{AE} = 1 / [1 - c (1 - t) - f]$, where $1 / [1 - c (1 - t) - f] > 1 / [1 - c (1 - t)]$.

Therefore, the statement is true: An increase in G is more effective in increasing Y when investment is also sensitive to income changes.

2. Comment on the following statement: *"A fiscally responsible government should always try to keep a balanced budget. Therefore, it should decrease expenditures when running a budget deficit and decrease taxes when running a budget surplus."*

There is nothing intrinsically wrong (or right, for that matter) with budget deficits. During the business cycle it is expected that governments will run deficits during periods of recession and surpluses during periods of economic boom. Overall, it would be advisable for government to run a balanced budget over the business cycle where the surpluses of the boom years would offset the deficits of the recession years.

The conservative proposition that governments should always run balanced budgets would have the effect of exacerbating the impact of recessive periods by further reducing aggregate demand when the latter is already weak. That is, it would result in the creation of more unemployment and greater excess productive capacity during recessions instead of contributing to their reduction. Similarly, the elimination of a surplus through a decrease in taxes during a period of economic boom would create further inflationary pressure in the economy.

This proposition has an ideological root and aims to reduce the economic role of the state to its minimum. The claim is that government expenditure should be reduced in period of recession to balance the budget, and taxes should be reduced in periods of boom for the same reason. The long-run result would be to minimize the economic and social role of the government. This proposition is based on what Krugman calls the "starving the beast" theory.

Chronic budget deficits — that is, deficits during periods of recession and also during periods of economic boom — are a different story. Here it could be argued that government deficits would crowd out private investment. If that's the case, then it could be argued that governments should try to run balanced budgets over the business cycle but not at all times. Put it differently, government should try to eliminate structural deficit but not cyclical ones.

In short, a deficit in any one year doesn't say much unless we look at it into the context of the business cycle. A deficit in a year of recession is something to be expected. What we must look at is what the full employment budget surplus (or deficit) would be. If at the level of potential output we could determine that the government would be running a surplus, then the best policy for the government might be to use expansionary instead of contractionary fiscal policy (even at the cost of increasing the deficit further in the short run). This could be seen in the diagram below, where we are assuming that government expenditure (G + TR) are given exogenously (i.e., are constant), and taxes are proportional to income. There is a deficit at the level of equilibrium income Y_1, but equilibrium income is below the level of full employment income (Y_{fe}). The diagram shows that, ceteris paribus, the government would be running a healthy surplus at the level of full-employment output. Therefore, instead of reducing government expenditure to reduce the deficit at equilibrium income Y_1, it would be best for the government to use expansionary fiscal policy to reduce the recessionary gap, even at the cost of further increasing the deficit in the short-run.
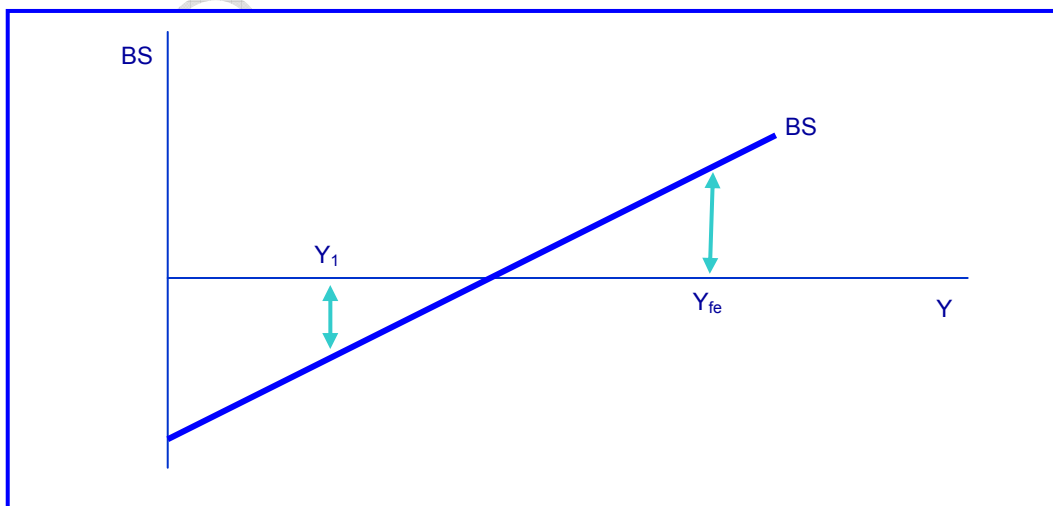
3. Answer true or false to the following statement: *"A decrease of $100 million in autonomous taxes will have a greater expansionary impact on equilibrium income and a smaller impact on the government budget surplus than an increase of $100 million in government expenditure on goods and services."* (Show your answer algebraically and <u>explain</u> the economics. Consider the AE model of a closed economy.)

This statement is false.

Let's examine first the respective impacts on equilibrium Y of these two policy options.

On the one hand, an increase of $100 in G directly increases autonomous AE by $100 and through the multiplying process causes equilibrium income to increase further by $100 times the expenditure multiplier — $\triangle Y = \alpha_{AE}\triangle G = \alpha_{AE}$ (100).

On the other hand, a decrease of $100 in autonomous taxes increases autonomous AE only indirectly and by a lesser amount. Indeed, the $100 decrease in autonomous taxes directly increases YD by $100 at all levels of Y, but not all of this increase in YD translates into an increase in C. Consumers will spend only a fraction "c" of every additional dollar of disposable income on C and thus autonomous expenditure will increase only by $c\triangle YD = c$ (100) < 100. Therefore, equilibrium income will increase by $\triangle Y = \alpha_{AE} * c$ (100) which is less than $\triangle Y = \alpha_{AE}$ (100).

Let's examine now the respective impacts on the government BS of these two policy options.

On the one hand, both policies will initially reduce the BS by $100. Indeed, the $100 increase in G will increase overall government expenditures by this amount and reduce the BS by $100, while the $100 decrease in autonomous taxes will reduce government revenues by this amount and reduce the BS by $100 as well. On the other hand, since these two policies have different impacts on equilibrium Y and government revenues (taxes) depend on the level Y, the increase in G will cause a greater increase in government revenues than the decrease in autonomous taxes. Therefore, the $100 decrease in autonomous taxes will end up causing a greater decrease in the government BS than the $100 increase in G.

Therefore, the statement is false — a $100 increase in G will have a greater impact on equilibrium Y and a smaller impact on the government budget surplus than a $100 decrease in autonomous taxes.

4. Answer true or false to the following statement: *"In a closed economy, national saving is equal to actual investment. Therefore, the government should implement policies that encourage greater saving to help the economy get out of a recession."* (Show your answer with the help of graphs and <u>explain</u> the economics. Consider the AE model of a closed economy.)

This statement is false.

Investment plays a very important role in the economy — it increases the capital stock of the country and thus it contributes to increasing the productive capacity of the economy. Therefore, there exists a general consensus among economists that high rates of investment are desirable and necessary for an economy to grow rapidly.

Since, by definition, saving is always equal to *actual* investment and high rates of investment are desirable, are high rates of saving also desirable?

Our *AE* model is static and thus unable to properly address the role of investment in the process of economic growth. Nonetheless, the *AE* model provides us with some important insights to answer the question regarding the desirability of high rates of saving. In this model, *planned* or *desired* investment expenditure plays a role only in the present period as part of overall aggregate expenditure — i.e., just like planned consumption expenditure, it contributes to create a demand for domestically produced goods. Therefore, *when there exists excess capacity in the economy*, higher *planned* investment is also desirable in the current period because it increases *AE* and thus equilibrium income.

However, higher *planned* investment does not depend on higher saving as some economists seem to suggest. Rather, the causation is the other way around: all else equal, higher planned investment determines higher saving. Indeed, higher planned saving implies lower planned consumption expenditure and, therefore, lower *AE*. In turn, lower *AE* results in involuntary accumulation of inventories and thus in higher *actual* investment. But there is nothing desirable in higher actual investment as a result of an involuntary accumulation of inventory since it ends up reducing output and income.

The above result is shown in the diagram on the right. Initially the economy is in equilibrium at the level of income Y₁. An increase in planned or desired saving causes desired consumption expenditure to decrease and the AE curve shifts down to AE'. A situation of excess supply arises in the economy and output and income start to fall towards the new equilibrium at Y₂.

The claim that planned saving is desirable because it determines planned investment is thus a fallacy. Moreover, the causation goes in the opposite direction—higher planned investment results in higher levels of planned saving. Indeed, an increase in planned investment raises the level of equilibrium income and, therefore, causes the levels of both planned consumption AND planned saving to rise.