Department of Economics
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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 45 minutes.
2. Aids allowed: a simple calculator.
3. Use pen instead of pencil.

DO NOT WRITE IN THIS SPACE

Part I _____ /38

Part II _____ /12

Part III   1. _____ /10

2. _____ /10

3. _____ /10

TOTAL _____ /80

PART I   (38 marks)

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

11	12	13	14	15	16	17	18	19
E	B	A	C	C	D	B	A	E

Correct: _____   Incorrect: _____   Blank: _____

1. Justin pays $150,000 to buy a newly-built house on July 1, 2014. Knowing that the rent for a similar house is $20,000 per year and that Justin previously lived rent-free with his parents, what is the impact of this transaction on 2014 GDP?
   A) Consumption rises by $10,000 and investment rises by $150,000.
   B) Consumption rises by $150,000 and investment is unchanged.
   C) Consumption is unchanged and investment rises by $150,000.
   D) Consumption rises by $10,000 and investment is unchanged.
   E) GDP is unchanged.

2. John buys a one-year government bond for $400. He receives principal and interest totalling $436 one year later. During the year the Consumer Price Index (CPI) rose from 150 to 162. The nominal interest rate on the bond was _____ percent, and the real interest rate was _____ percent.
   A) 9; 3.
   B) 9; 1.
   C) 9; -1.
   D) 36; 24.
   E) 36; 12.

Use this space for rough work.

The information in the following table describes a hypothetical economy, where prices are expressed in dollars and quantities in units. Use this data to answer questions 3 to 6 below.

	2013		2014	
	Price	Quantity	Price	Quantity
Good A	4	45	5	40
Good B	10	40	6	60
Good C	10	10	10	8

3. Compared to its level in 2013, nominal GDP _____ by approximately _____ percent in 2014.
   A) increased; 4.5.
   B) increased; 5.2.
   C) increased; 5.7.
   D) decreased; 5.2.
   E) decreased; 5.9.

4. In constant 2013 dollars, real GDP _____ by approximately _____ percent in 2014.
   A) increased; 18.5.
   B) increased; 23.5.
   C) increased; 28.5.
   D) decreased; 15.2.
   E) decreased; 28.5.

5. Using the chain method, real GDP _____ by approximately _____ percent in 2014.
   A) increased; 18.9.
   B) increased; 20.4.
   C) increased; 25.7.
   D) decreased; 15.2.
   E) decreased; 25.9.

6. According to the GDP deflator, the annual rate of inflation was approximately _____ percent in 2014.
   A) 18.6.
   B) 21.9.
   C) -21.6.
   D) -23.8.
   E) -28.1.

Use this space for rough work.

7. Assume that the government budget deficit decreased by $15 billion, private saving decreased by $20 billion, exports increased by $10 billion, and imports increased by $15 billion. By how much did investment change?
   A) Investment decreased by $10 billion.
   B) Investment decreased by $20 billion
   C) Investment increased by $10 billion.
   D) Investment increased by $20 billion
   E) Investment did not change at all.

8. Suppose that GDP is $5,200, disposable income is $4,400, consumption is $4,100, the government budget deficit is $150, and net exports is $110. In this economy, what is the level of investment?
   A) 70.
   B) 60.
   C) 40.
   D) 30.
   E) 20.

9. A Toronto dealership imports 40 new cars at a cost of $16,000 per car in July of 2014, and by December 31, 2014 has sold 20 of these cars at a price of $20,000 each. The remaining cars were sold in January 2015 at a price of $18,000 each. As a result of these transactions, GDP increased by _____ in 2014.
   A) $400,000.
   B) $320,000.
   C) $120,000.
   D) $80,000.
   E) none of the above.

10. Jim's Nursery produces and sells $1,300 worth of flowers. Jim uses $200 in seeds and fertilizer, pays his workers $700 in wages, pays $100 in taxes, pays $200 in interest on a loan, and makes a profit of $100. What is Jim's contribution to GDP?
    A) $900.
    B) $1,000.
    C) $1,100.
    D) $1,200.
    E) $1,300.

Use this space for rough work.

11. Suppose that Future Shop had 2,000 computers in its warehouse on December 31, 2013. Each computer was valued at $500. By December 31, 2014, Future Shop had 2,500 computers in its warehouse, each valued at $450. In 2014, Future Shop's inventory investment was _____.
- **A)** $250,000.
- **B)** $225,000.
- **C)** $1,125,000.
- **D)** $237,500.
- **E)** $125,000.

12. According to the Aggregate Expenditure model of the economy, an increase in government expenditure has a larger effect on income when
- **A)** exports are greater than imports.
- **B)** the marginal propensity to save is relatively small.
- **C)** investment is relatively large.
- **D)** the marginal propensity to import is relatively large.
- **E)** the marginal propensity to consume is relatively small.

13. Consider a closed economy with a fixed price-level and a balanced government budget at the initial equilibrium. A drop in government purchases will cause
- **A)** consumption to fall, business inventories to rise, and a government surplus.
- **B)** business inventories to rise and a government surplus, but no change in consumption.
- **C)** both consumption and business inventories to fall, but no change in the government budget balance.
- **D)** both consumption and business inventories to fall, and a government surplus.
- **E)** a government surplus but no change in either consumption or business inventories.

14. Suppose that the government has a balanced budget, the tax rate (t) is 0.10, the expenditure multiplier (α_{AE}) is 4, and full-employment income (Y^*) is 900. If $Y = 700$ and the government wants to move the economy to full-employment while keeping a balanced budget, then the government could
- **A)** decrease G by 20 in combination with expansionary monetary policy.
- **B)** increase G by 20 in combination with contractionary monetary policy.
- **C)** increase G by 20 in combination with expansionary monetary policy.
- **D)** increase taxes by 20 in combination with expansionary monetary policy.
- **E)** decrease taxes by 20 in combination with contractionary monetary policy.

Use this space for rough work.

15. Consider a closed economy with a fixed-price level. If investment is insensitive to the interest rate, which one of the following statements would be correct?

  A) The LM curve will be steep.
  B) The IS curve will be flat.
  C) Monetary policy will have a large effect on nominal interest rates.
  D) Monetary policy will have a large effect on output.
  E) The LM will be flat.

16. Suppose that the money supply varies directly with the interest rate. Then, compared to the situation when the money supply is fixed,

  A) the IS will be steeper.
  B) the IS will be flatter.
  C) the LM curve will be steeper.
  D) the LM curve will be flatter.
  E) the slopes of the IS and LM curves will not change.

17. Which of the following is true when savings decrease at all levels of disposable income?

  A) The IS curve shifts down to the left.
  B) The IS curve shifts up to the right.
  C) The LM curve shifts down to the right.
  D) The LM curve shifts up to the left.
  E) None of the above is true.

18. Fiscal policy is more effective in increasing national income when

  A) investment is not very responsive to interest rate changes.
  B) the marginal propensity to save is high.
  C) money demand is not very responsive to interest rate changes.
  D) the income tax rate is very high.
  E) money demand is very responsive to real income changes.

19. If people suddenly wish to hold more money at all levels of the rate of interest,

  A) the money supply curve will shift to the right.
  B) the equilibrium rate of interest will fall.
  C) the LM curve will shift down to the right.
  D) the IS curve will shift down to the left.
  E) equilibrium real income will fall.

Use this space for rough work.

PART II   (12 marks)

Consider the following model of the economy:

$C = 100 + 0.9\,YD$
$I = 300 - 20i$
$G = 400$
$TR = 250$
$TA = 50 + 0.2\,Y$
$NX = 100 - 0.12\,Y$
$Y_{fe} = 3000$

a) What is the equation for the *IS* curve in this model? *Show all your work.* **(2 marks)**

Let's find the equation for the *AE* curve first:

$AE = C + I + G + NX$
$\quad = (100 + 0.9\ YD) + (300 - 20\ i) + 400 + (100 - 0.12\ Y)$
$\qquad\quad$ where $YD = Y + TR - TA = Y + 250 - (50 + 0.2\ Y) = 200 + 0.8\ Y$
$\quad = [100 + 0.9\ (200 + 0.8\ Y)] + (300 - 20\ i) + 400 + (100 - 0.12\ Y)$
$\quad = (280 + 0.72\ Y) + (300 - 20\ i) + 400 + (100 - 0.12\ Y$
$\quad = 1080 - 20\ i + 0.6\ Y$

Let's find now the equation for the *IS* curve:

$Y = AE$
$\quad = 1080 - 20\ i + 0.6\ Y$
$20\ i = 1080 - 0.4\ Y$
$i = 54 - 0.02\ Y$

b) What is the level of equilibrium (*Y**) income when *i* = 6? **(1 mark)** What is the size of the aggregate expenditure multiplier (α_{AE})? **(2 marks)** *Show all your work.*

If $i^* = 6$, then Y^* is:

$6 = 54 - 0.02\ Y^*$
$0.02\ Y^* = 48$
$Y^* = 48/0.02 = 2400$

And the aggregate expenditure multiplier is:

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

c) What is the level of private saving (S) when the economy is in equilibrium at $i = 6$? **(1 mark)** What is the level of government saving (or budget surplus, BS) at this equilibrium? **(1 mark)** *Show all your work.*

$S = YD - C$

Where $YD = Y + TR - TA = Y + 250 - (50 + 0.2\ Y) = 200 + 0.8\ Y$ and $Y^* = 2400$, therefore,

$YD = 200 + 0.8\ (2400) = 200 + 1920 = 2120$.

And $C = 100 + 0.9\ YD = 100 + 0.9\ (2120) = 100 + 1908 = 2008$.

Therefore, $S = YD - C = 2120 - 2008 = 112$.

$BS = TA - (G + TR)$

$\quad = 50 + 0.2\ Y - (400 + 250)$

$\quad = 0.2\ Y - 600$

$\quad = 0.2\ (2400) - 600$

$\quad = 480 - 600$

$\quad = -120$.

d) Given the situation of the economy and the budgetary situation of the government you have described above, what should the government do to improve this situation? *Explain your answer.* **(5 marks)**

Since equilibrium income is 2400 and full-employment income is 3000, then the economy is in recession and the recessionary gap is 400. Further, at the current equilibrium Y the government is having a fiscal deficit of 120.

However, if the economy were operating at full capacity, i.e., if $Y^* = 3000$, then the budget surplus would be:

$\quad BS = 0.2\ Y - 600 = 0.2\ (3000) - 600 = 600 - 600 = 0.$

Since $BS = 0$ at full employment, then the government is currently experiencing a *cyclical* deficit and not a *structural* one. Therefore, it might be advisable for the government to increase its expenditure on goods and services to kick start the economy, even at the cost of increasing the budget deficit further in the short run.

The new government expenditure might help stopping the contraction of the economy and even contribute to some expansion, but more importantly it will help to improve the expectations of the private sector regarding the economy. And once the private sector becomes more optimistic and starts spending again, the government could start decreasing its spending in order to achieve a balanced budget over the business cycle.

PART III   (30 marks)

Instructions: Answer the following three questions in the space provided. You may continue your answer on page 12 if additional space is required (**but clearly indicate that your answer continues on page 12**). Each question is worth 10 marks.

1. Consider a closed economy consisting of only three sectors: energy & electricity, cement & construction material, and wood & agricultural products. The table below provides information about the total revenues and expenditures of these three sectors. Assume that households purchase all output not sold to these three sectors.

Energy & Electricity		Cement & Construction Material		Wood & Agricultural Products	
Total sales:	$1800	Total sales:	$1400	Total sales:	$1400
Expenditures on:		Expenditures on:		Expenditures on:	
Wages	800	Wages	300	Wages	300
Cement	400	Cement	250	Cement	350
Wood	100	Wood	100	Wood	100
Energy	200	Energy	400	Energy	200
Profits:	300	Profits:	350	Profits:	450

Answer the following questions by showing exactly what items must be *included* or *excluded* — i.e., you must show *all* your work and not just the final numerical answer.

a) Calculate GDP using the value added approach. **(4 marks)**

Value added = Total revenues – Cost of intermediate goods
Total revenues = $1800 (Energy etc.) + $1400 (Cement etc.) + $1400 (Wood etc.) = $4600
Cost of intermediate goods is the cost of cement, wood and energy in each of the three sectors:
Cost of interm. goods = $700 (Energy etc.) + $750 (Cement etc.) + $650 (Wood etc.) = $2100
Therefore, the total value added is $4600 – $2100 = $2500.

b) Calculate GDP using the value of final goods. **(3 marks)**

A total of $300 of the wood output of $1400 is used as an intermediate product in the three sectors – thus only $1100 of the wood output is a final good.
A total of $1000 of the cement output of $1400 is used as an intermediate product in the three sectors – thus only $400 of the cement output is a final good.
A total of $800 of the energy output of $1800 is used as an intermediate product in the three sectors – thus only $1000 of the cement output is a final good.
Therefore, the total value of final goods is $2500.

c) Calculate GDP using the income approach. **(3 marks)**

The total income generated in this economy is the summation of wages and profits in each of the three sectors. Therefore, the total income is $1400 in wages + $1100 in profits = $2500.

(Continue on page 12 if necessary)

2. Critically comment on the following statement:

"A responsible government should always try to keep a balanced budget. Therefore, it should reduce 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. Over the business cycle it is expected that governments will run deficits during periods of recession (due to fall in government revenues) and surpluses during periods of economic boom (due to the rise in government revenues). Overall, government should 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 this one 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.

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.

Chronic budget deficits — that is, deficits during both periods of recession and periods of economic boom — are a different matter. Here it could be claimed that government deficits would crowd out private investment. If that's the case, then the claim should be that governments should try to run balanced budgets over the business cycle but not at all times.

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. To determine whether a deficit (or a surplus) should be a matter of concern we should estimate 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 fiscal/monetary policy instead of contractionary fiscal policy (see diagram). This could be seen in the diagram below, where we are assuming that government expenditures (G + TR) are exogenous variables (i.e., independent of income), and taxes are proportional to income. There is a deficit at the level of equilibrium income Y_1, but full employment income (Y_{fe}) is much greater. The diagram shows that, ceteris paribus, the government would be running a healthy surplus at the level of potential 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 or monetary policy to reduce the gap between current income and potential income, even at the cost of further increasing the deficit in the short-run.

3. Critically comment on the following statement:

> *"Expansionary fiscal policy would be more effective if investment expenditure were an increasing function of income."*

Show your answer algebraically and <u>explain</u> the economics. Consider the *aggregate expenditure model* of a closed economy as developed in class.

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., $\Delta Y = \alpha_{AE} \Delta G$.

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" 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. This is the multiplying effect of an increase in autonomous expenditure and, in this case, 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., $\Delta Y = \alpha_{AE} \Delta G$. 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 goods market, a fraction "c" 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). Therefore, in this case the marginal propensity to spend is 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 multiplying effect of an increase in autonomous expenditure is greater since 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 an increasing function of income.

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