York University

Atkinson Faculty of Liberal and professional Studies

Department of Economics

ECON1010C – Term Test 2

July 20, 2005

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Suggested Solutions

PART A

1. B
2. A
3. D
4. B
5. C
6. B
7. B
8. A
9. D
10. B
11. C
12. B
13. D
14. C
15. A
16. C
17. C
18. B
19. A
20. A

Part B True/ False/ Uncertain Questions [10 marks]

Each question is worth 5 marks.

Answer two of the following three questions in the answer booklet.

Explain why the following statement is True, False, or Uncertain according to economic principles. Use diagrams and/or numerical examples where appropriate. Unsupported answers will receive no marks. It is the explanation that is important.

B1. A tax cut would lead to a decrease in equilibrium real output of an economy which is currently operating below potential income.

False

A tax cut would lead to an increase in equilibrium real output of an economy which is currently operating below potential income.

Assume that the economy currently operates at A and produces Y_1 quantity of real GDP which is below potential real output. This means the economy currently has a recessionary gap. Assume that the price level remains fixed, say at P_1 and that there is no crowing out effect and net export effect. A tax cut would increase the disposable income, which would, in turn, lead to a higher consumer spending. As a result, aggregate expenditures would increase, resulting into a higher equilibrium real output.

If the tax cut comes in the form of a decrease in autonomous taxes (T_0) only, then autonomous aggregate expenditures would rise and AE would shift upward from AE_1 to AE_2, as shown in Figure B-1(a). The equilibrium would move from A to B with an increase in real output from Y_1 to Y_2.

If the tax cut comes in the form of a decrease in tax rate (t) only, then induced aggregate expenditures would rise with no change in autonomous aggregate expenditures. This means AE would rotate counter-clockwise from AE_1 to AE_2 (AE curve would be steeper), as shown in Figure B-1(b). The equilibrium would move from A to B with an increase in real output from Y_1 to Y_2.

If the tax cut comes in the form of a decrease in both tax rate (t) and autonomous taxes (T_0), then both autonomous and induced aggregate expenditures would rise. This means the slope of AE curve would rise as it shifts from upward from AE_1 to AE_2, as shown in Figure B-1(c). The equilibrium would move from A to B with an increase in real output from Y_1 to Y_2.

TERM TEST 2 – SOLUTION

FIGURE B-1 (a): A DECREASE IN AUTONOMOUS TAXES (T_0)

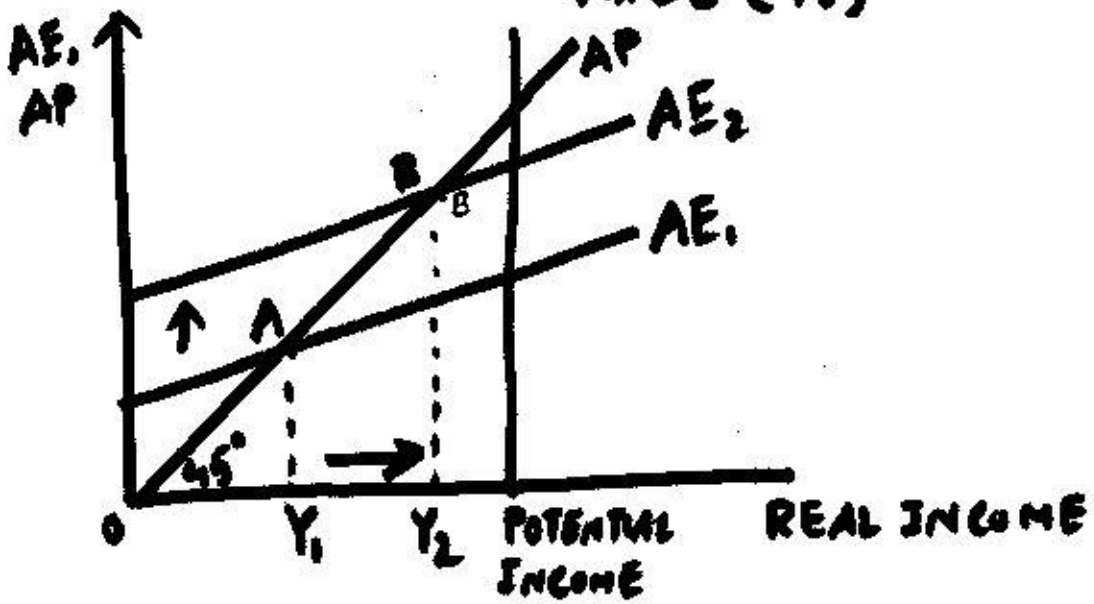
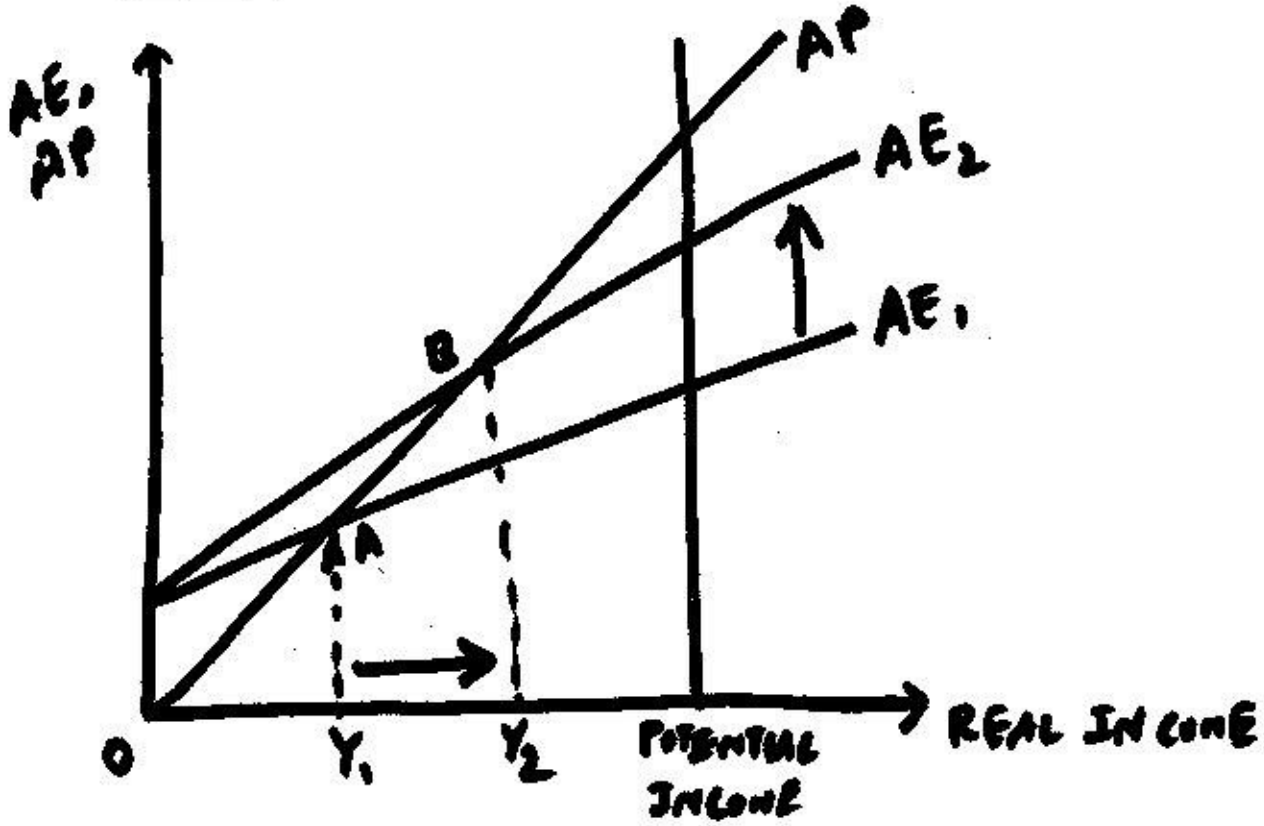
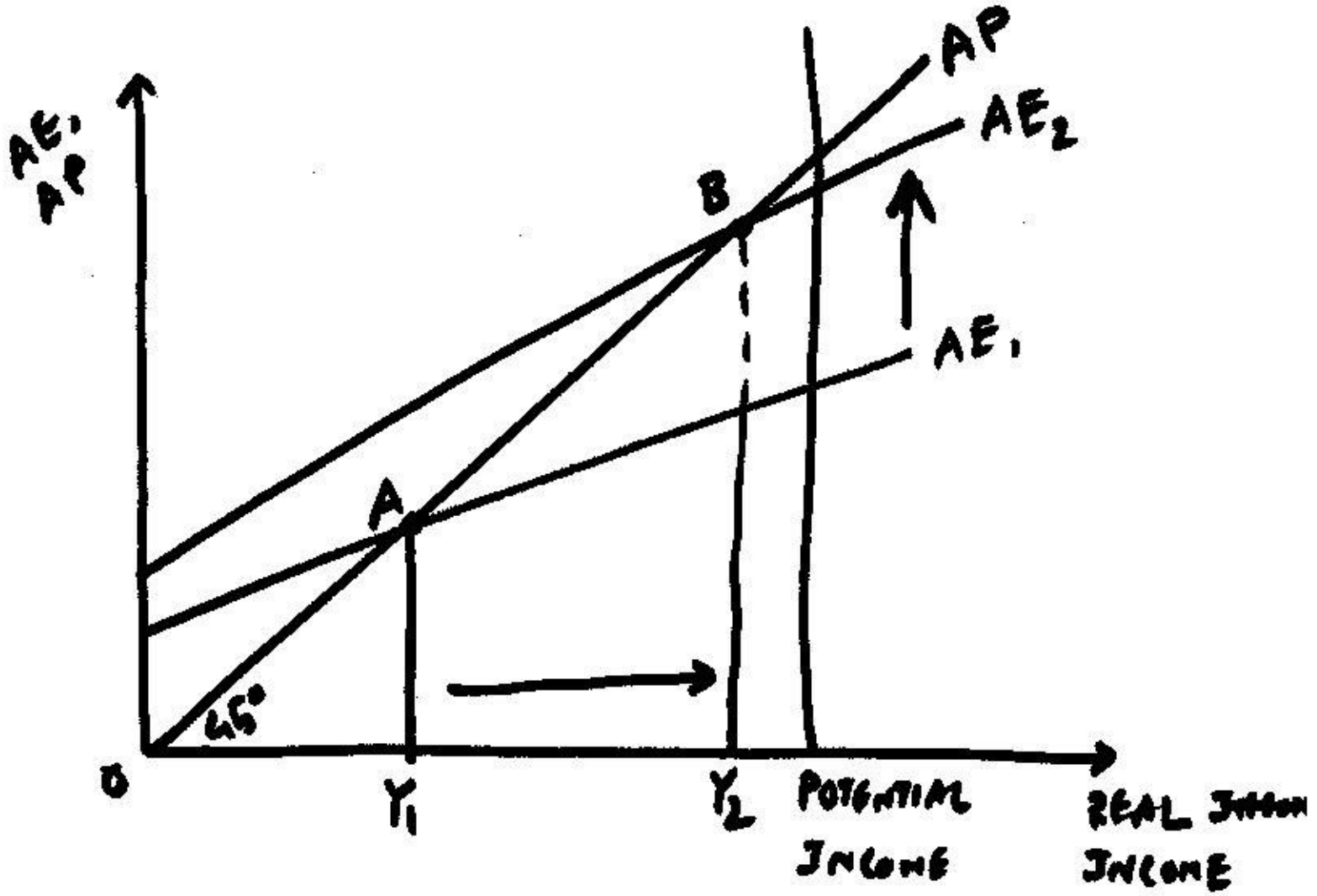


FIGURE B-1 (b): A DECREASE IN TAX RATE (t)



TERM TEST 2 - SOLUTION

FIGURE B-1(c_0) : A DECREASE IN BOTH AUTONOMOUS TAXES (T_0) AND TAX RATE (t)



B2. The net export effect weakens the effects of a contractionary fiscal policy.

False

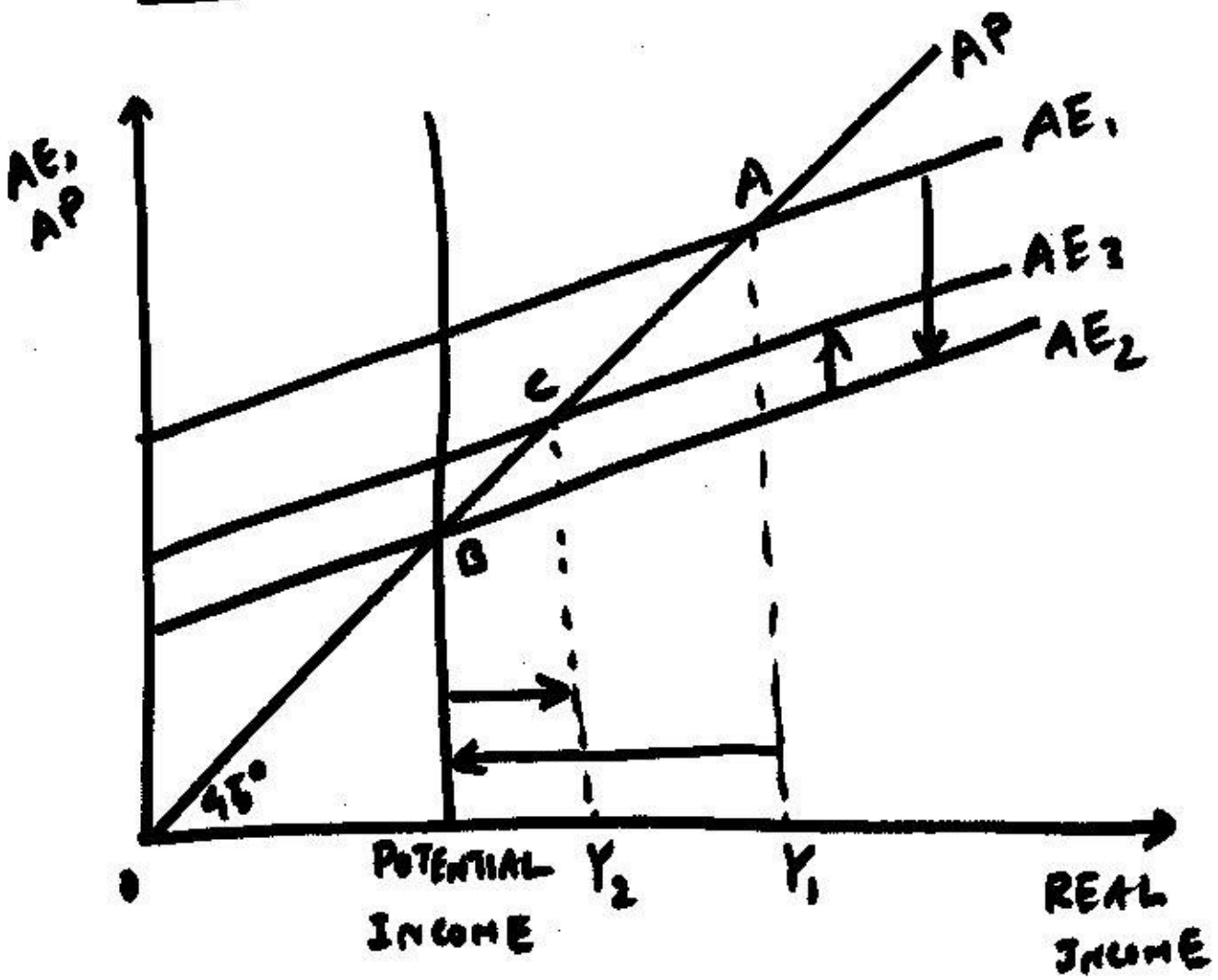
The net export effect (international effect) can partially offset the effects of a contractionary fiscal policy.

Assume that an economy currently operates at an inflationary equilibrium A with Y_1 level of real output. The government adopts a contractionary fiscal policy by decreasing its spending G in order to remove the existing inflationary gap. This policy aims to shift the AE curve from AE_1 to AE_2 and thus move the economy from A to B. Without any net export effect the government could have achieved its target and decrease real output to the potential level. However, a decrease in G would lead to a surplus budget or a decrease in budget deficit. This means government borrowing from the domestic loanable funds market would decrease. A fall in government borrowing decreases the demand for loanable funds, which would drive the price of loanable funds downward. The price of loanable funds is nothing but domestic interest rate. As domestic interest rate decreases, foreigners would like to invest less in domestic currency denominated assets. This means the demand for domestic currency would decrease, which would led to a depreciation (a decrease in the value of domestic currency) of domestic currency. Consequently, domestic exports would become relatively less expensive. This would lead to an increase in domestic exports and a decrease in domestic imports. This means domestic net exports would rise resulting into an increase in domestic aggregate expenditures. So, aggregate expenditure function would shift upward from AE_2 to AE_3 and the economy would move back from B to C.

Thus, because of the offsetting net export effect the aggregate expenditure function would ultimately shift from AE_1 to AE_3 and equilibrium output would decrease to only Y_2, not to potential real income.

TERM TEST 2 ■ SOLUTION

FIGURE B-2: CONTRACTIONARY FISCAL POLICY



B3. A rise in real interest rate of a country increases the debt to Nominal GDP ratio.

Uncertain

It depends on the real interest rate relative to the real GDP growth rate and the ratio of the budget deficit (net of debt service payments) to Nominal GDP.

We know that the change in the debt to nominal GDP ratio is calculated as,

Change in Debt to Nominal GDP ratio

= (Budget Deficit net of debt service payments/ Nominal GDP) +
(Real interest rate – Real GDP growth rate)* (Debt to Nominal GDP ratio)

There are two factors affecting the change in debt to nominal GDP ratio. The first is the ratio of the budget balance (net of interest payments on the debt) to GDP; the second is the inflation-adjusted interest rate (real interest rate) relative to the real GDP growth rate. If real interest rate, even after an increase, is lower than the real GDP growth rate and the government runs a balanced budget (net of interest payments on the debt), then a country's the debt to nominal GDP ratio would fall. For example, assume that because of the balanced budget (net of interest payments on the debt) the first factor is zero and real interest rate is 2%, real GDP growth rate is 3% and debt to nominal GDP ratio is 0.6. With this information, we can find, using the above mentioned formula, that the change in debt to nominal GDP ratio is -0.006. If other things remaining constant, if real interest rate increases to 2.5%, then the change in debt to nominal GDP ratio would be -0.003. This shows that the debt to nominal GDP ratio can decrease following an increase in real interest rate. However, if real interest rate increases to 3.5%, other things remaining constant, then the change in debt to nominal GDP ratio would be 0.0003. This shows that the debt to nominal GDP ratio can also increase following an increase in real interest rate.

However, if the real interest rate, after an increase, is higher than the real GDP growth rate, but if the positive second factor cannot offset the negative first factor (when government runs a budget surplus (net of interest payments on the debt)), then a country's the debt to nominal GDP ratio would fall following an increase in real interest rate.

Part C Problem Solving Question [10 marks]

Answer one of the following two questions in the answer booklet.

C-1

Consider the following simple, fixed price, open economy model of Canadian economy with excess capacity:

$C = 55 + .75Y_d$

$T = 36 + 0.30Y$

$R = 16$

$I = 64$

$G = 62$

$X = 54$

$IM = 20 + 0.191Y$

where, *C* is consumption, Y_d is disposable income, *T* is taxes, *R* is government transfers, *Y* is real GDP, *I* is investment, *G* is government expenditures on goods and services, *X* is exports and *IM* is imports. Note that $Y_d = Y - T + R$.

(a) Solve for aggregate expenditures (*AE*) as a function of *Y*, and calculate the equilibrium level of real GDP. Illustrate your equilibrium in a diagram with *AE* on the vertical and *Y* on the horizontal axis. What is the value of the multiplier? [2+2+2 = 6 Marks]

We know the aggregate expenditures (*AE*) is defined as,

$AE = C + I + G + (X - IM)$ (1)

It is given that,

$C = 55 + .75Y_d$ (2)

We also know that disposable income (Y_d) is defined as,

$Y_d = Y - T + R$ (3)

Substituting (3) into (2),

$$C = 55 + .75[Y - T + R] \qquad (4)$$

Now substituting the values of *T* and *R*, which are given in the question, into (4),

$$C = 55 + .75[Y - 36 - 0.30Y + 16]$$
or, $C = 55 + 0.75Y - 27 - 0.225Y + 12$
$\therefore C = 40 + 0.525Y \qquad (5)$

Now substituting C from (5) and the values of I, G, X and IM from the information given in the question into the aggregate expenditure function (1),

$$AE = C + I + G + (X - IM)$$
or, $AE = 40 + 0.525Y + 64 + 62 + (54 - 20 - 0.191Y)$
$\therefore AE = 200 + 0.334Y \qquad (6)$

Thus, (6) shows aggregate expenditures as a function of *Y*.

We know that the equilibrium condition is,

$$Y = AE \qquad (7)$$

Substituting (6) into (7),

$$Y = 200 + 0.334Y$$
or, $Y - 0.334Y = 200$ (By subtracting 0.334Y from both sides)
or, $0.666Y = 200$
or, $Y = \frac{200}{0.666}$ (By dividing both sides by 0.666)

$\therefore Y = 300.30 \cong 300$

So, the equilibrium level of real GDP is 300.

Figure C-1(a) illustrates this model. $\boldsymbol{AE_1}$ curve in that figure shows the aggregate expenditure function and point ***A*** shows the equilibrium point.

The multiplier of this model can be calculated by either of the following two formulas.

$$\text{Multiplier} = \frac{1}{1-(c-ct-m)}$$
$$= \frac{1}{1-(0.75-0.75*0.30-0.191)}$$
$$= \frac{1}{1-0.334}$$
$$= \frac{1}{0.666}$$
$$= 1.50$$

or, Multiplier = 1/ (1-Slope of AE function)
= 1/(1- 0.334)
= 1/0.666
= 1.50

So, the value of the multiplier is 1.50.

[Alternative Method:

We can also calculate the equilibrium level of real GDP by using the multiplier equation.

We know that the multiplier equation is,

Y = Multiplier * Autonomous Expenditures
∴ Y = 1.5 * 200 (Substituting the value of autonomous expenditures from equation (6))
= 300]

(b) What will happen to the equilibrium *Y* in part (a), if investment declines to 44 because of the stock market crash? Find the new equilibrium *Y* and show it in the diagram. [2+2= 4 Marks]

If investment (*I*) decreases to 44, the total autonomous aggregate expenditures will decrease by 20 from 200 to 180. This means the new aggregate expenditure function will be,

$$AE = 180 + 0.334Y \qquad (8)$$

We know that the equilibrium condition is $Y = AE$ (9)

Substituting (8) into (9),

$Y = 180 + 0.334Y$
or, $Y - 0.334Y = 180$ (By subtracting 0.334Y from both sides)
or, $0.666Y = 180$
or, $Y = \frac{180}{0.666}$ (By dividing both sides by 0.666)
$\therefore Y = 270.27 \cong 270$

So, the new equilibrium level of real GDP is 270.

[We can also calculate the new equilibrium level of real GDP by following either of the two alternative methods.

Alternative Method1:

We know that the multiplier equation is,

Y = Multiplier * Autonomous Expenditures (Note: use new autonomous expenditures)
$\therefore$ Y = 1.50 * 180
= 270

Alternative Method 2:

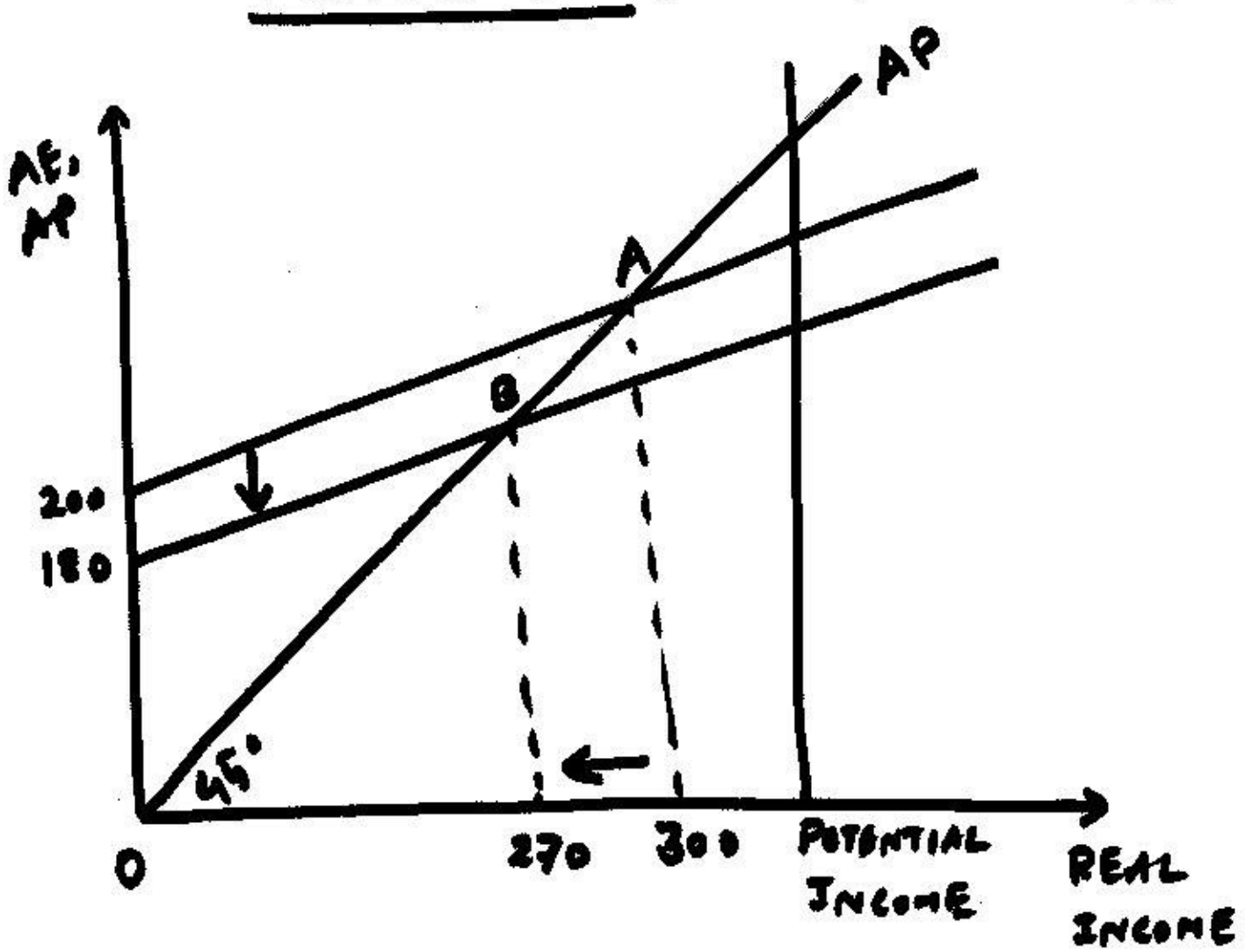
We know that the multiplier equation is,

Y = Multiplier * Autonomous Expenditures
So, Change in Y = Multiplier * Change in Autonomous Expenditures
$\therefore$ Change in Y = 1.50 * 20
= 30
This means the new equilibrium real output = 300 - 30
= 270
$\cong$ 270]

Figure C-1 illustrates this new equilibrium. $\boldsymbol{AE_2}$ curve in that figure shows the new aggregate expenditure function (equation (8)). As investment declines to 44, aggregate expenditure function shifts downward from $\boldsymbol{AE_1}$ to $\boldsymbol{AE_2}$. The economy moves from the initial equilibrium at point ***A*** to the new equilibrium point at point ***B***.

TERM TEST 2 [redacted] SOLUTION

FIGURE C-1 : MULTIPLIER MODEL



C-2

Assume that the aggregate expenditure function of a hypothetical economy is given by the following equation.

$AE = 250 + 0.5Y$

Assume also that the following equations describe the current fiscal policy:

$T = 30 + 0.20Y$

$R = 40$

$G = 100$

where, *T* is tax revenue, *R* is government transfers, *Y* is real GDP and *G* is government expenditures on goods and services.

In addition, assume that the potential income of this economy is 400.

(a) Calculate the equilibrium level of real GDP, actual budget deficit, structural budget deficit and passive or cyclical budget deficit. [Hint: Budget Deficit = G+R-T]. [1+1+1+1= 4 Marks]

$AE = 250 + 0.5Y$ (1)

We know that the equilibrium condition is $Y = AE$ (2)

Substituting (2) into (1),

$Y = 250 + 0.5Y$
or, $Y - 0.50Y = 250$ (By subtracting 0.50Y from both sides)
or, $0.5Y = 250$
or, $Y = \frac{250}{0.5}$ (By dividing both sides by 0.5)
$\therefore Y = 500$

So, the equilibrium level of real GDP is 500.

[We can also calculate the new equilibrium level of real GDP by following the alternative method.

Alternative Method:

Multiplier = 1/ (1-Slope of AE function)
= 1/(1- 0.5)
= 1/0.5
= 2

We know that the multiplier equation is,

Y = Multiplier * Autonomous Expenditures
∴ Y = 2 * 250 (Substituting the value of autonomous expenditures from equation (1))
= 500]

Actual Budget Deficit = G + R - T
= G + R – (30 + 0.20Y) [Note: Y here is the equilibrium real GDP]
= 100 + 40 – (30+0.20*500)
= 140- 130
= 10
This means the government has an actual budget deficit of 10 at the equilibrium.

Structural budget deficit is the budget deficit prevailing at potential real income.

Structural Budget Deficit = G + R - T
= G + R – (30 + 0.20Y_p) [Note: Y_p here is potential real income]
= 100 + 40 – (30+0.20*400)
= 140- 110
= 30
This means the government has a structural budget deficit of 30.

Passive or Cyclical Budget Deficit = Actual Budget Deficit – Structural Budget Deficit
= 10 – 30
= -20

This means the government has a cyclical budget surplus of 20 at the equilibrium. This cyclical budget surplus is arising from the fact that the economy is currently operating above potential income.

(b) How should the government adjust its spending (G) to completely remove any existing recessionary or inflationary gap? Assume that government successfully changed its spending (G) to remove the gap. Find the new actual budget deficit, structural budget deficit and passive or cyclical budget deficit at the new equilibrium. [1+1+1+1= 4 marks]

Since the current equilibrium output is above potential income, there is an inflationary gap in this economy. Inflationary Gap = Equilibrium Output - Potential Income
= 500 – 400
= 100

The multiplier of this economy is 2 (refer to the calculation shown in Part (a) above)

To remove this inflationary gap, the government has to decrease its spending (G). The amount of the change in G can be calculated as,

Change in G = Inflationary Gap / Multiplier
= 100/ 2
= 50
This means the government has to decrease G by 50.

Assume that government has successfully decreased its spending (G) to remove the inflationary gap. So, the new equilibrium level of real GDP will be 400.

[**Note: It is not required to show the calculation of new equilibrium level of real GDP.**

The initial expenditure function:

$AE = 250 + 0.5Y$ (1)

If *G* decreases by 50, the total autonomous aggregate expenditures will decrease from 250 to 200. This means the new aggregate expenditure function will be,

$AE = 200 + 0.50Y$ (3)

We know that the multiplier equation is,

Y = Multiplier * Autonomous Expenditures (Note: use new autonomous expenditures)
∴ Y = 2 * 200
= 400

So, the new equilibrium level of real GDP is 400, which is equal to potential income. It shows that the increased government spending achieved its target to remove the inflationary gap.]

The new equilibrium level of real GDP is equal to potential real income of 400. So, the new actual budget deficit should be equal to new structural budget deficit.

Actual or Structural Budget Deficit = G + R - T
= G + R – (40 + 0.20Y_p) [Note: G here is new lower level of G]
= 50 + 40 – (30+0.20*400)
= 90 -110
= -20
This means the government has an actual or a structural budget surplus of 20.

Passive or Cyclical Budget Deficit = Actual Budget Deficit – Structural Budget Deficit
= -20 – (-20)
= 0
This means the government has no cyclical budget deficit at the new equilibrium. Zero cyclical budget deficit is resulting from the fact that the economy is currently operating at potential income.

(c) Solve for the initial budget surplus function (BS = T-G-R) and plot it in a diagram. Show the actual budget deficit and structural budget deficit you found in part (a). Show how the initial budget surplus function would response to the change you prescribed in part (b). Show the new actual budget deficit and structural budget deficit you found in part (c). [1 + 1= 2 marks]

The initial budget surplus function (BS_1):
BS_1= T-G-R
or, $BS_1= 30+0.20Y-100-40$
or, BS_1=-110+ 0.20Y

So, the initial budget surplus function is, BS_1=-110 + 0.20Y. This function is plotted in Figure C-2. To plot this function we need two points. One point is the negative vertical intercept (-110) which is obvious from the function. The other point can be the horizontal intercept (550). To find the horizontal intercept, set BS_1=0 in the budget surplus function and solve for Y. That is,

0=-110+0.20Y
or, 0.20Y=110
or, Y= $\frac{110}{0.20}$ (Dividing both sides by 0.20)
or, Y = 550

If you connect the vertical intercept (-110) and the horizontal intercept (550) and extend it upward, you will get the budget surplus function BS_1 as shown in Figure C-2. The initial actual budget deficit of 10 (found in part (a)) is shown as the vertical distance between BS_1 and the horizontal axis at initial equilibrium level of real GDP of 500. The initial structural budget deficit of 30 (found in part (a)) is shown as the vertical distance between BS_1 and the horizontal axis at potential real income of 400.

New budget surplus function (BS_2) with the lower level of government spending:

BS_2= T-G-R
or, $BS_2 = 30 + 0.2Y - 50 - 40$
or, BS_2=-60 + 0.2Y

So, the new budget surplus function is, BS_2=-60 + 0.2Y. This function is plotted in Figure C-2. To plot this function we also need two points. One point is the negative vertical intercept (-60) which is obvious from the function. The other point can be the horizontal intercept (300). To find the horizontal intercept, set BS_2=0 in the new budget surplus function and solve for Y. That is,

0=-60+0.2Y
or, 0.2Y=60
or, $Y = \frac{60}{0.2}$ (Dividing both sides by 0.2)
or, Y = 300

If you connect the vertical intercept (-60) and the horizontal intercept (300) and extend it upward, you will get the budget surplus function BS_2 as shown in Figure C-2. Since the new equilibrium level of real GDP is equal to potential income, the new actual budget surplus is equal to new structural budget surplus. Both surpluses, which are equal to 20, are shown as the vertical distance between BS_2 and the horizontal axis at potential income of 400.

By comparing these two budget surplus functions, we find that the initial budget surplus function shifted upward by the vertical distance of 50 in response to the decrease in G by 50.

TERM TEST 2 — SOLUTION

FIGURE C-2: BUDGET SURPLUS FUNCTION