Prof. Gustavo Indart
Department of Economics
University of Toronto

ECO 209Y
MACROECONOMIC THEORY
Problem Set 3-4

1. Consider the following model of the economy:

   C = $\overline{C}$ + cYD (consumption)
   YD = Y – TA + TR (disposable income)
   I = $\overline{I}$ (investment)
   G = $\overline{G}$ (government expenditure)
   TR = $\overline{TR}$ (government transfer payments)
   TA = t Y (taxes)

   a) What is the equation for the AE (aggregate expenditure) curve in this model?
   b) What is the equilibrium level of income?
   c) What is the aggregate expenditure multiplier in this model?
   d) i) What is the marginal propensity to consume out of *disposable income* MPC_{YD})?
      ii) What is the marginal propensity to save out of *disposable income* (MPS_{YD})?
      iii) What is the marginal propensity to consume out of *income* (MPC_Y)?

2. Consider the following model of the economy:

   C = 50 + 0.8YD
   I = 70
   G = 200
   TR = 100
   TA = 0.25Y
   YD = Y – TA + TR

   a) What is the equation for the AE curve in this model?
   b) What is the equilibrium level of income?
   c) What is the aggregate expenditure multiplier in this model?
   d) What is the level of private saving when the economy is in equilibrium?
   e) i) What proportion of investment is financed by private saving?
      ii) What is the government budget deficit and how is it financed?

3. Let's add the external sector to the model described in the preceding problem. The external sector is described by the following expressions:

   X = 150
   Q = 10 + 0.14 Y

   a) Calculate the equilibrium level of income and the multiplier in this model.
   b) Why is the multiplier less than the one obtained in the previous problem?
   c) Derive an expression for the trade balance, NX, as a function of income.
   d) Calculate the effect on equilibrium income and the trade balance of an increase in exports from 150 to 200.

4. Consider the following closed economy:

$C = 10 + 0.8\ YD$

$YD = Y - TA + TR$

$TA = 0.25\ Y$

$TR = 20$

$I = 20$

$G = 30$

a) What is the equation for the AE curve in this model?

b) What is the equilibrium level of income?

c) What is the aggregate expenditure multiplier in this model?

d) What is the level of private saving when the economy is in equilibrium? What is the level of national saving when the economy is in equilibrium?

e) Compare the effect on output of increasing government expenditure (G) by two units with the effect on output of increasing transfer payments (TR) by two units.

f) What value of G is necessary, given the values of the other exogenous variables, for the government budget surplus (BS) to equal zero (a balanced budget)?

g) Suppose that full-employment output was $Y^* = 202$. What change in G would be required to achieve full-employment output?

h) Given your answer in g), what would be the full-employment budget surplus (BS^*)?

5. Assume the following model of the expenditure sector:

$Y = C + I + G + NX$

$C = 420 + (4/5)\ YD$

$YD = Y - TA + TR$

$TA = (1/6)\ Y$

$TR = 100$

$I = 160$

$G = 180$

$NX = -40$

a) Assume the government would like to increase the equilibrium level of income (Y) to the full-employment level $Y^* = 2{,}700$. By how much should government purchases (G) be changed?

b) Assume we want to reach $Y^* = 2{,}700$ by changing government transfer payments (TR) instead. By how much should TR be changed?

c) Assume you increase both government purchases (G) and taxes (TA) by the same lump sum of $\Delta G = \Delta TA = 300$. Would this change in fiscal policy be sufficient to reach the full-employment level of output at $Y^* = 2{,}700$? Why or why not?

d) Briefly explain how a decrease in the marginal propensity to save would affect the size of the expenditure multiplier.

6. Answer true, false, or uncertain to the following statements:

a) Consider the aggregate expenditure model of the economy with no government sector and no external sector. If current output is below the level of equilibrium output, then saving will be greater than desired investment and unintended inventory accumulation will occur.

b) In a closed economy, the balance budget multiplier is always equal to one.

c) Consider the aggregate expenditure model for a closed economy as developed in class, where taxes are independent of income (i.e., $t = 0$). A policy of greater transfer payments and an unchanged budget surplus will have an expansionary effect on the economy.

d) The simple expenditure multiplier would be smaller if investment expenditure were a function of the level of income.

7. Consider the following model of an open economy where all values are in millions of dollars:

C = 500 + 0.8 YD	AE = C + I + G + NX
I = 500 + 0.13 Y	YD = Y – TA + TR
G = 1500	TA = 1000 + 0.1 Y
NX = X – Q	TR = 1000
X = 2000	
Q = 0.1 Y	Y_{fe} = \$20,000

   a) Derive the expression for the AE curve for this economy. What is the value of the expenditure multiplier (α_{AE})?
   b) What is the level of equilibrium income in this economy? What is the value of the recessionary or inflationary gap?
   c) By how much should autonomous AE increase in order to achieve equilibrium at the level of full-employment income?
   d) What is the government budget surplus/deficit at the level of equilibrium income?
   e) If the government decides to change its own expenditures on goods and services (G) in order to achieve a balanced budget when the economy is in equilibrium, by how much should it change G?
   f) Comment on the above government policy decision of changing G in order to achieve a balanced budget. Do you think that it was a correct decision from the economic point of view? [Note: Assume that the government debt is zero.]
   g) If the government wanted to achieve full-employment equilibrium, by how much should G be changed? What would be the change in the government budget surplus/deficit both in the short run (i.e., immediately after the policy decision of changing G is implemented) and in the long run (i.e., when the economy achieves the new equilibrium)?

8. Consider the following model of a closed economy:

Desired consumption expenditure	$C = 325 + 0.8YD - 10i$
Desired investment expenditure	$I = 100 - 15i + 0.08Y$
Desired government purchases	$G = 260$
Government transfer payments	$TR = 100$
Taxes	$TA = 50 + 0.1Y$
Full-employment income	$Y_{fe} = 3200$

   a) As a function of Y and i, what is the equation for private saving (S) in this model? As a function of Y, what is the equation for public saving (BS)? As a function of Y and i, what is the equation for national saving (S_N)?
   b) If equilibrium income (Y^*) is 3000, what is the equilibrium rate of interest (i^*) in this economy?
   c) What are the values of private saving (S), public saving (BS), national saving (S_N), and investment (I) at the equilibrium of part b) above?
   d) Suppose now that the central bank implements expansionary monetary policy and reduces the rate of interest to 4 percent (i.e., $i = 4$). At $Y = 3000$, what will be the values of private saving (S), national saving (S_N), and desired investment (I) when $i = 4$?
   e) At $i = 4$ and $Y = 3000$, is the economy in equilibrium? Why or why not? If not, how is equilibrium to be restored? Briefly explain. If the economy is not in equilibrium at $i = 4$ and $Y = 3000$, what will be the level of equilibrium income if the central bank keeps the rate of interest constant at 4 percent?
   f) What are the values of private saving (S), public saving (BS), national saving (S_N), and investment (I) at the level of equilibrium income of part e) above?