Exercise 3
Keynesian Cross and the Multiplier

1. The Keynesian consumption function assumes that $0 < MPC < 1$; what is the basis for such assumption?
2. Assume a CLOSED economy with NO government. Let the autonomous consumption be 200 and MPS be 0.3. Draw and write equations for both saving and consumption functions.
3. Let the saving function be $S = -150 + 0.35Y$. Find and draw the consumption function.
4. How do the followings affect the AE graph (i.e. explain how the graph changes) and the equilibrium output?

- All firm managers decide to buy fewer machines.
- The government decides to build more roads.
- The citizens decide to save more at all income levels.
- The citizens decide to save larger proportion of income.
- The government decides to raise tax.

5. In the Keynesian Cross Model, suppose that aggregate output is greater than aggregate expenditure. Explain the adjustment process towards the equilibrium.
6. Let $C = 60 + 0.6Y$ and $I = 20$. Find the equilibrium output with the saving/investment approach.
7. Let $S = -60 + 0.4Y$ and $I = 20$. Find the equilibrium output with the standard approach. Now, suppose I increases by 20. Find the new equilibrium and the investment multiplier.
8. With the multiplier effect, an injection of money (for example, investment) can lead to a greater proportional increase in output. Explain how this can happen.
9. How is the investment multiplier related to MPC? Explain the intuition behind such relationship. (Hint: Question 9)
10. What is the Paradox of Thrift? Explain it with diagram.

marginal propensity consumption

1. The Keynesian consumption function assumes that $0 < MPC < 1$; what is the basis for such assumption? การตั้งสมมุติฐาน

MPC is income that is consume or spend increase, output will increase. less than 1 because people keep part of income for saving.

Why $0 < MPC < 1$?

ex. income 100 ฿

MPC = 0.5

ซื้อ 50 ถ้า MPC = 1 คือซื้อเงินทั้งหมดที่หามา

Consumption fn → $C = a + by$ (mpc)

mpc = proportion of income that we use to consume also called amount of consumption depended on income.

2. Assume a CLOSED economy with NO government. Let the autonomous consumption be 200 and MPS be 0.3. Draw and write equations for both saving and consumption functions.

ma

$C = a + by$

$C = 200 + 0.7y$

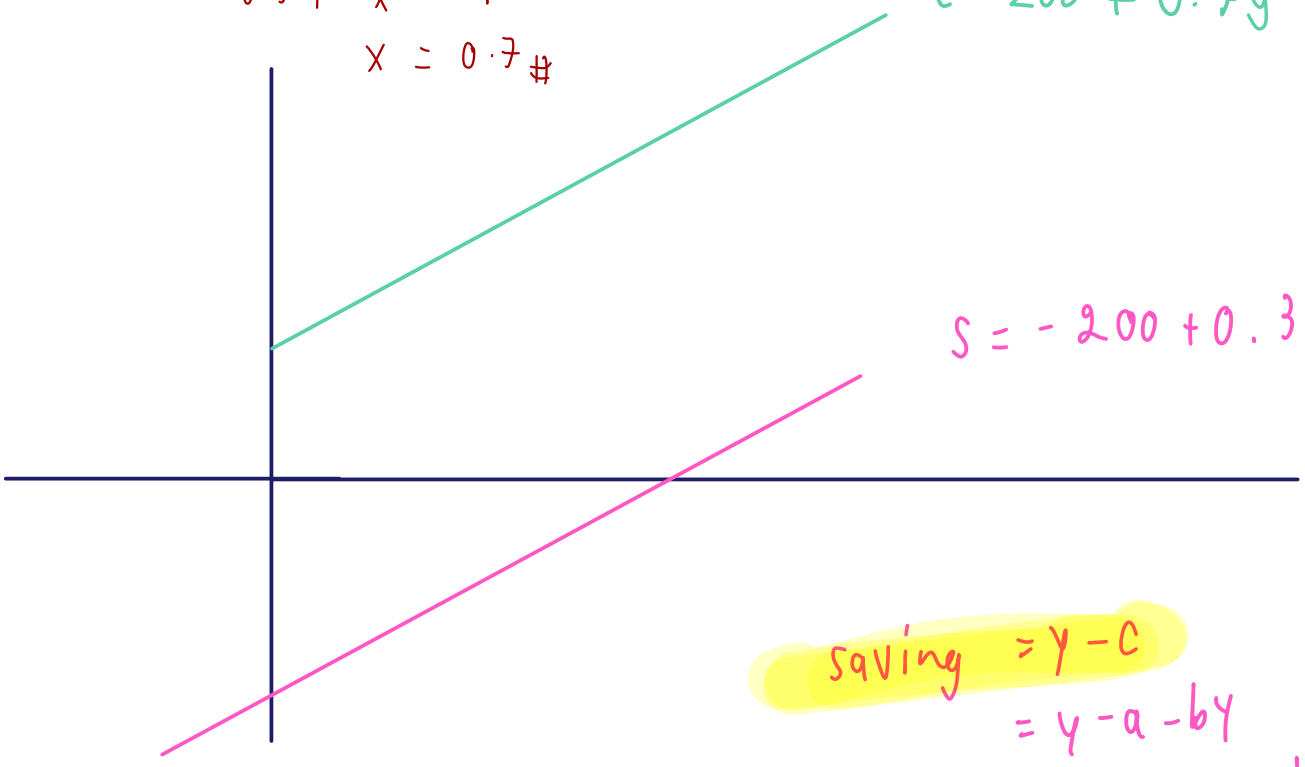
From income = saving + consumption

So MPS + MPC = 1

$0.3 + X = 1$

$X = 0.7$ #

$C = 200 + 0.7y$



$S = -200 + 0.3y$

saving $= Y - C$

$= y - a - by$

or $= -a + (1-b)y$

mpc

$C = 200 + 0.7y$

$S = -200 + 0.3$ #

$S = -200 + (1 - 0.7)y$

$S = -200 + 0.3y$

MPC = Proportion of income that we use to consume
also called amount of consumption depended on income

Ex. income = 100 B, MPC = 0.5

2. Assume a CLOSED economy with NO government. Let the autonomous consumption be 200 and MPS be 0.3. Draw and write equations for both saving and consumption functions.

C_0

$200 + 0.7Y = -200 + 0.3Y$

$400 = -0.4Y$

Y

From income = saving + consumption

So MPS + MPC = 1 → 0.3 + MPC = 1 → MPC = 0.7

Consumption

$C = C_0 + C_1Y$

$C = 200 + C_1Y$

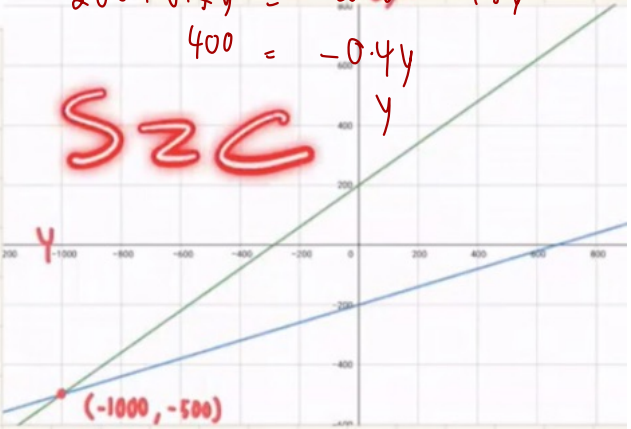
$C = 200 + 0.7Y$

Saving

$Y = S + C \rightarrow S = Y - C$

$S = Y - (200 + 0.7Y)$

$S = -200 + 0.3Y$



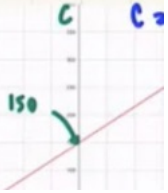
3. Let the saving function be S = -150 + 0.35Y. Find and draw the consumption function.

Saving function formula

$S = Y - (C_0 + C_1Y)$

So $-C_0 = -150$ and $1 - C_1 = 0.35$

$\therefore C_0 = 150$ $\quad \therefore C_1 = 0.65$



3. Let the saving function be S = -150 + 0.35Y. Find and draw the consumption function.

$S = y - C$

$-150 + 0.35y = y - C$

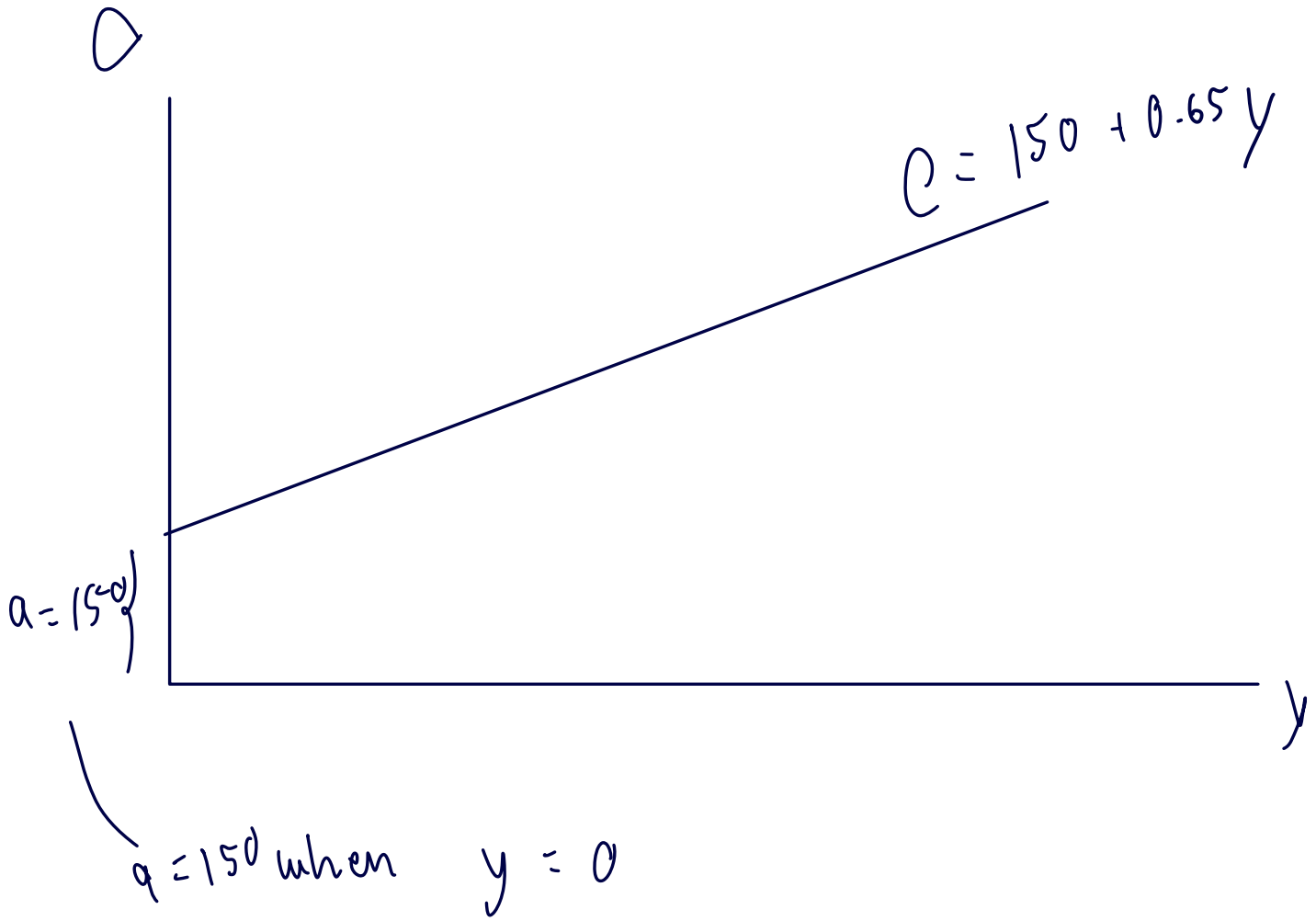
$C = 0.65y + 150$

$a = 150$

$b = 0.65$

$C = a + by$

$C = 150 + 0.65y$



$AE = C + I + G + x - M$

$(Y - T)$

aggregate output = income

must

$AE = Y$

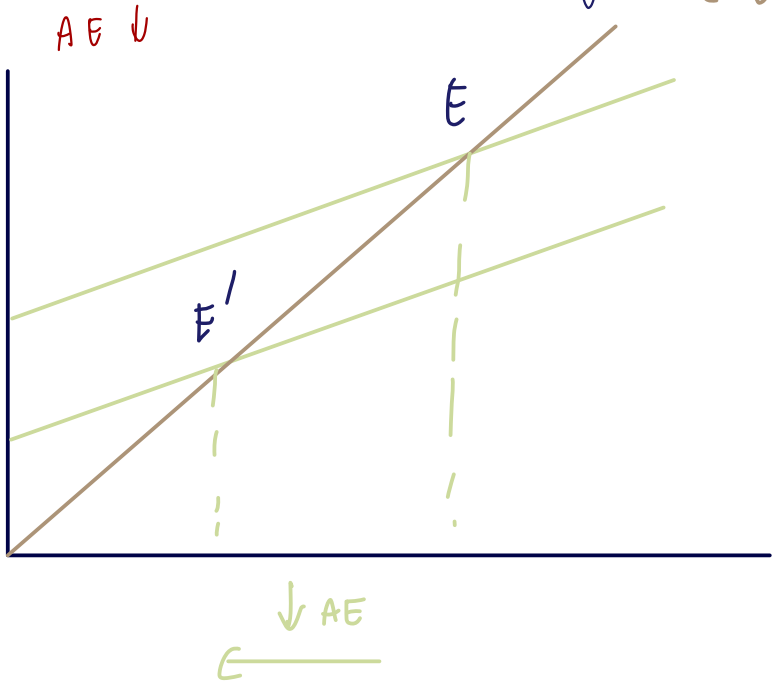
income

produce

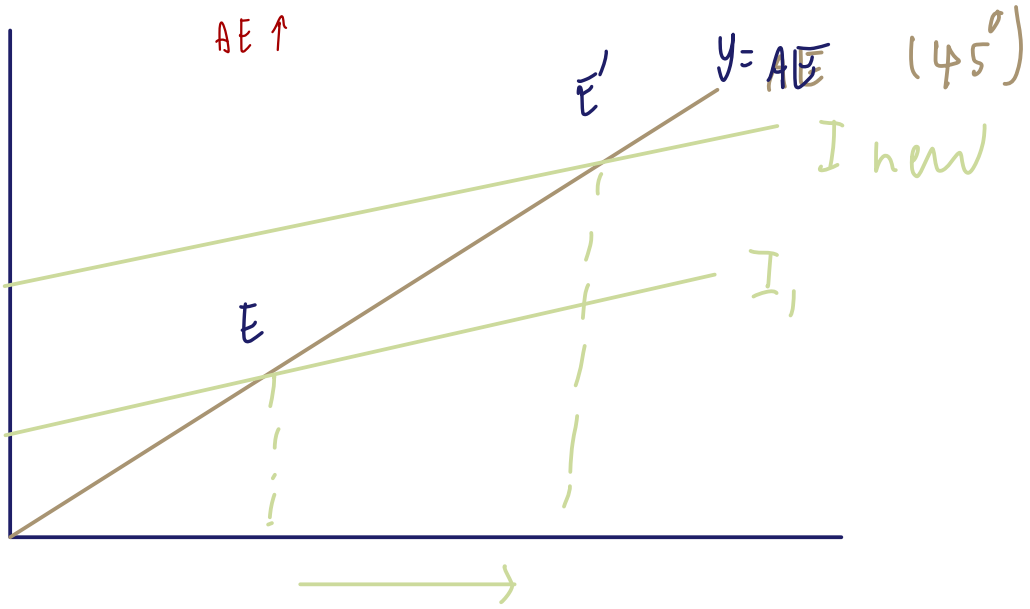
4. How do the followings affect the AE graph (i.e. explain how the graph changes) and the equilibrium output?

1. All firm managers decide to buy fewer machines. I ↓ AE ↓ → y^* ↓
2. The government decides to build more roads. G ↑ AE ↑ y^* ↑
3. The citizens decide to save more at all income levels. S ↑ AE ↓ y^* ↓
4. The citizens decide to save larger proportion of income. MPS ↑ MPC ↓ y^* ↓
5. The government decides to raise tax.

① AE ↓



② AE ↑

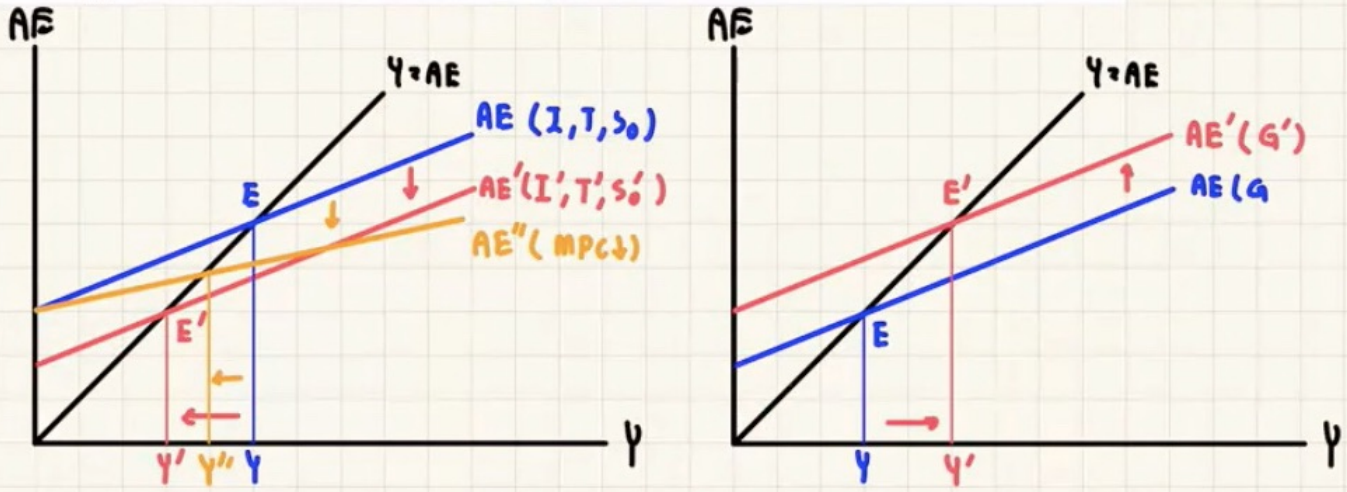


* save more at all income → not depended on Y → S ↑

C = a + by

* save large proportion of income → MPS ↑ Due to MPS + MPC = 1 ⇒ MPS ↑ + MPC ↓ = 1

- The citizens decide to save larger proportion of income.
- The government decides to raise tax. T↑ ⇒ AE↓ ⇒ Y*↓



* Save more at all income → Not depended on Y → S0↑

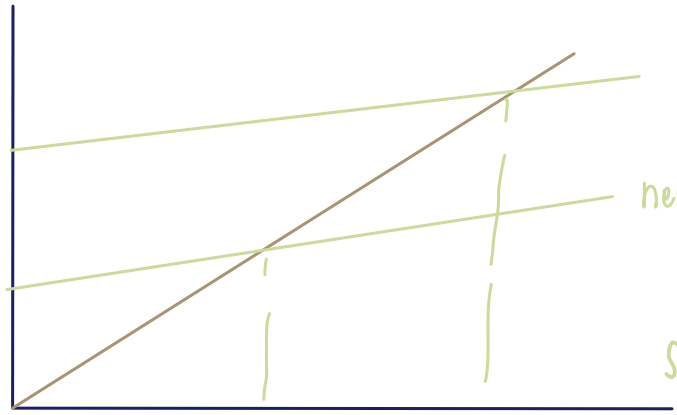
consumption = $C_0 + C_1 Y$

* Save larger proportion of income → MPS↑ Due to MPC + MPS = 1 ⇒ MPS↑ + MPC↓ = 1

↓

Consumption↓

3



$s = y - c$

$C = C_0 + C_1 y$

C_1 | MPC

$s = -C_0 + (1 - C_1) y$

C_0 | change

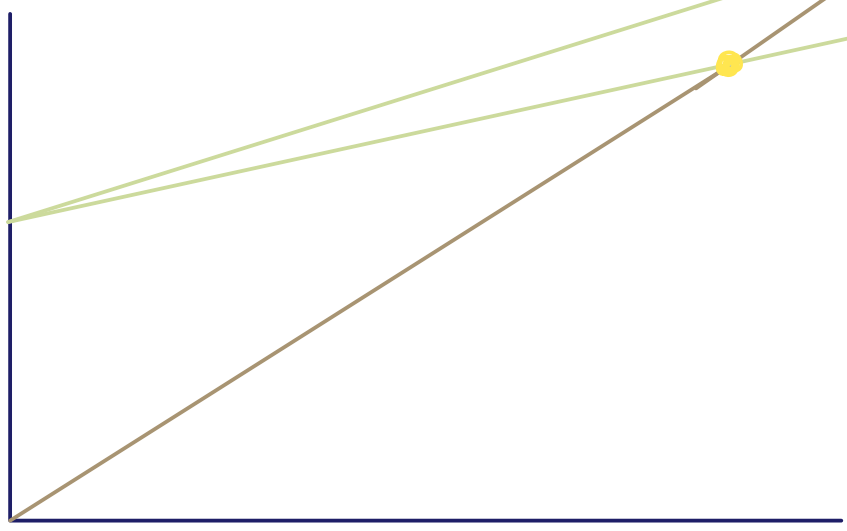
$S = -150 + 0.2 \longrightarrow S = -100 + 0.2y$

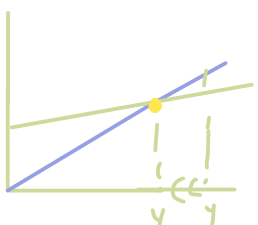
save more at all income level

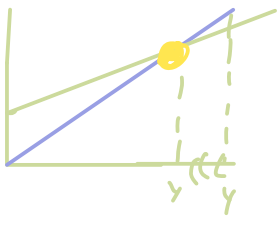
Saving increase 50

(Increase in autonomous saving)

4







5

$AE = C + I$

$C = a + bY_d$ ← $Y_d + I$

Y_d ← Total income − net tax

$Y_d = Y - T$

$T_1 = 50$

$T_2 = 100$

Tax ↑, C ↓, Y_d ↓, AE ↓

Y^* = output

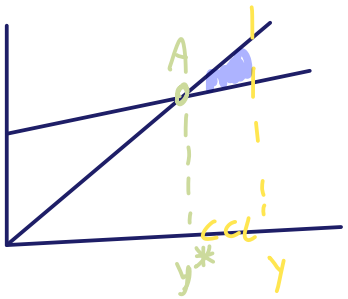
5. In the Keynesian Cross Model, suppose that aggregate output is greater than aggregate expenditure. Explain the adjustment process towards the equilibrium.

output > AE expenditure

Y (output) more than AE (expenditure)

AE = Y

Firms must produce less goods in order to adjust toward equilibrium or otherwise firm will have a lot of inventories.



In this case, aggregate output is more than aggregate income, inventories will accumulate, so that bussiness need to cut back of production to make $Y_1 = Y_2$

6. Let C = 60 + 0.6Y and I = 20. Find the equilibrium output with the saving/investment approach.

saving = $-60 - 0.4Y$

$S = I$

$20 = -60 + 0.4y$

$80 = 0.4y$

$C = 60 + 0.6Y \quad I = 20$

$Y = C + I$

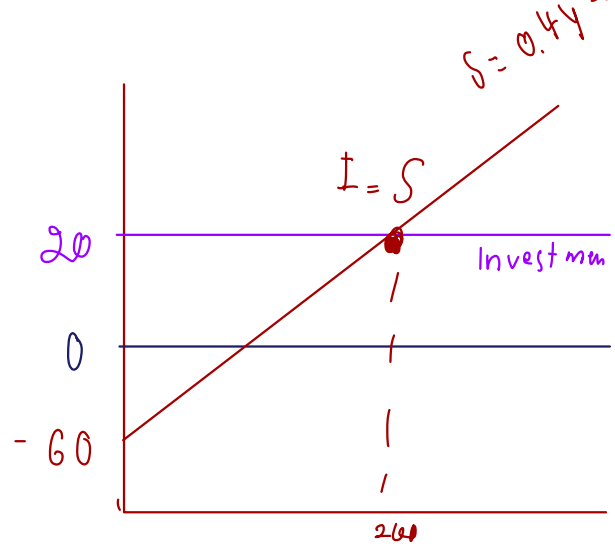
$Y = 60 + 0.6Y + 20$

$Y = 80 + 0.6y$

$0.4Y = 80$

$Y^* = 200$ #

output



7. Let S = -60 + 0.4Y and I = 20. Find the equilibrium output with the standard approach. Now, suppose I increases by 20. Find the new equilibrium and the investment multiplier.

$S = -60 + 0.4Y \quad I = 20$

$S = Y - C$

$-60 + 0.4Y = Y - C$

$C = 60 + 0.6Y$

$Y = C + I$

$Y = 60 + 0.6Y + 20$

$0.4Y = 80$

$Y^* = 200$ #

$\frac{1}{1 - MPC}$

Investment $= \frac{\Delta Y}{\Delta I}$

$\therefore I = 40$

$Y = C + I$

$Y = 60 + 0.6Y + 40$

$0.4Y = 100$

$Y = 250$ #

The investment multiplier.

$\frac{1}{1 - MPC} = \frac{1}{1 - 0.6} = \frac{1}{0.4} = 2.5$ #

8. With the multiplier effect, an injection of money (for example, investment) can lead to a greater proportional increase in output. Explain how this can happen.

MPC = 0.9

$I = 100 \rightarrow Y_A = 100$

$C_A = 90$ $S_A = 10$

Y_B

$C_B = 81$ $S_B = 9$

inject multiplier depend on ΔY^* and ΔAE

If I ↑ = AE↑

when money injected, firm have more money to operate their bussiness this means firm can buy mor machine hire more labour. Therefore, the are more money in flow of income, labour have more income, and increase output.

7. Let S = -60 + 0.4Y and I = 20. Find the equilibrium output with the standard approach. Now, suppose I increases by 20. Find the new equilibrium and the investment multiplier.

$S = Y - C$

$-60 + 0.4Y = Y - C$

$-60 - 0.6Y = -C$

$C = 60 + 0.6Y$

old

$AE = 60 + 0.6Y + 20$

$Y = 80 + 0.6Y$

$0.4Y = 80$

$Y^* = 200$

new

$AE = 80 + 0.6Y + 20$

$Y = 100 + 0.6Y$

$0.4Y = 100$

$Y^* = 250$

$$\frac{\Delta Y}{\Delta I} = \frac{50}{20} = 2.5$$

9. How is the investment multiplier related to MPC? Explain the intuition behind such relationship. (Hint: Question 9)

When people spend a lot of money (high MPC), others will receive a lot of money as ther income. When MPC is large, the mutiplier is large.

$$\text{Investment multiplier} = \frac{1}{1 - MPC}$$

(No gov and close economic)

10. What is the Paradox of Thrift? Explain it with diagram.

An increase Autonomous saving lead to decrease in aggregate expenditure and also decrease output. Household and firms cut their spending in economy.