EXERCISE 4

1. Answer the following questions.

1.1 Suppose Govt Multiplier is 5 and $\Delta G = 5$. Find ΔY.

1.2 Suppose Tax Multiplier is -3 and $\Delta Y = -9$. Find ΔT.

1.3 Suppose $\Delta Y = 10$ and $\Delta I = 2$. Find Investment Multiplier.

1. Govt Multiplier = 5 and $\Delta G = 5$ find ΔY

Govt multiplier = $\frac{\Delta Y}{\Delta G}$

$5 = \frac{\Delta Y}{5}$

$\Delta Y = 25$

∴ When Government spending increase by 1 unit, output increase by 5 units

1.2 Tax Multiplier is -3 and $\Delta y = -9$ find ΔT

Tax multiplier $= \frac{\Delta Y}{\Delta T}$

$-3 = \frac{-9}{\Delta T}$

$\Delta T = 3$

∴ When tax increase by 1 unit, output decrease by 3 units

1.3 $\Delta Y = 10$ find investment multiplier

$\Delta I = 2$

investment multiplier $= \frac{\Delta Y}{\Delta I} = \frac{10}{2} = 5$

2. From $Y = C + I + G$ where $C = C_0 + C_1(Y - T)$, find

2.1 Equilibrium Output Y^*

2.2 $\Delta Y/\Delta I$

2.3 $\Delta Y/\Delta G$

2.4 $\Delta Y/\Delta T$

2.5 Balanced-Budget Multiplier (BBM)

2.6 Explain what the BBM is.

(2) $Y = C + I + G$ where $C = C_0 + C_1(Y - T)$

2.1 Equilibrium output Y^*

$$AE = C + I + G$$

$$Y = AE$$

$$Y^* = C + I + G$$

$$Y^* = C + C_0 + C_1(Y - T) + I + G$$

$$Y^* = C + C_0 + C_1 Y + C_1 T + I + G$$

$$Y - C_1 Y = C_0 - C_1 T + I + G$$

$$Y(1 - C_1) = C_0 - C_1 T + I + G$$

$$Y = \frac{1}{(1 - C_1)}(C_0 - C_1 T + I + G)$$

2.2. $\Delta Y / \Delta I$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope of AE}}$$

$$AE = C + I + G$$
$$AE = C_0 + C_1(Y - T) + I + G$$
$$AE = (C_0 - C_1 T + I + G) + C_1 Y$$

C_1 — slope of AE

2.3 $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope of AE}}$

$$AE = C + I + G$$
$$AE = C_0 + C_1(Y - T) + I + G$$
$$AE = C_0 + C_1 Y - C_1 T + I + G$$
$$AE = (C_0 + C_1 T + I + G) + C_1$$

2.4 $\Delta Y / \Delta T$

$AE = C + I + G$

$AE = C_0 + C_1(Y - T) + I + G$

$AE = C_0 + C_1 Y - C_1 T + I + G$

$AE = (C_0 - C_1 T + I + G) + C_1 Y$

C_1 slope of AE

As T is lenmage ; $\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - \text{slope AE}}$

2.5 BBM

Balance budget multiplier

$$\frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T_0} = \frac{1 - C_1}{1 - C_1}$$

2.6 what is BBM

BBM = change in aggregate output when both G and I increase by 1 unit.

$AE = C + I + G$

3. Assume a closed economy with government. The country has the following components of aggregate expenditure.

C = 300 + 0.75(Yd)	I = 50
G = 50	T = 50 (lump-sum tax)

3.1 Use the Y = AE (standard) approach to find the equilibrium output.

3.2 Draw the Keynesian Cross, and find the intercept on the vertical axis and the slope of the AE schedule.

3.3 Use the Leakage = Injection (or saving/investment) approach to find the

(3) 1 Assume a closed economy with government. The country has the following components of aggregate expenditure.

$C = 300 + 0.75(Yd)$ $I = 50$

$G = 50$ $T = 50$ (lump-sum tax)

use $Y = AE$ standard approach to find equilibrium output

$AE = C + I + G$

$= C_0 + C_1(Y - T) + I + G$

$= 300 + 0.75(Y - 50) + 50 + 50$

$= 300 + 0.75Y - 37.5 + 100$

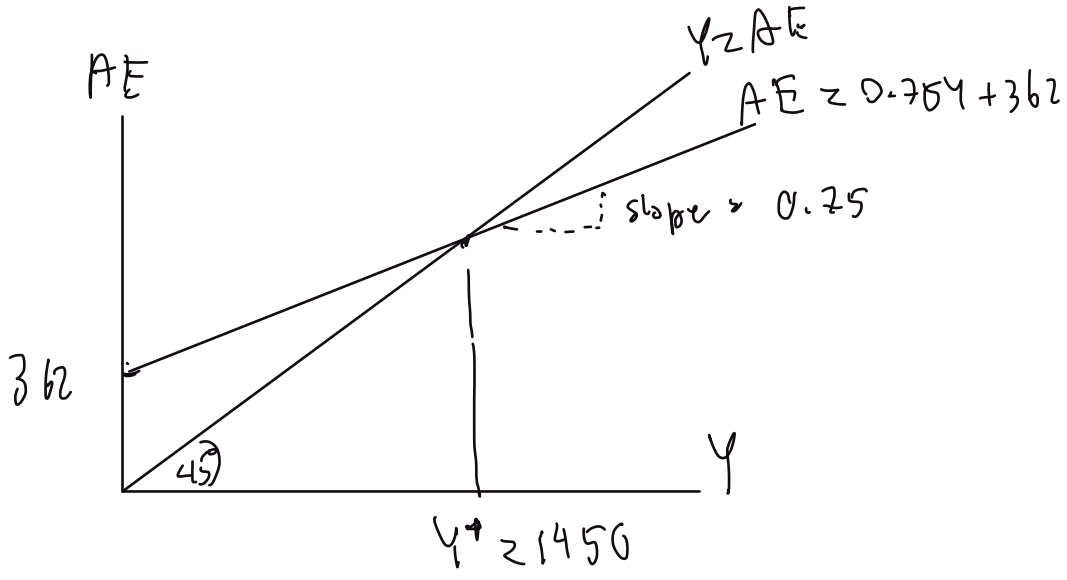
$Y - 0.75Y = 362.5$

$0.25Y = 362.5$

$Y^* = 1450$

$Y = 0.75Y + 362$

3.2



3.3. leakage = Injection (or saving/investment) approach to find the equilibrium level of output

$S + T = I + G$ ① leakage = injection

$Y - T = C + S$ ② saving function

$S = I + G - T$

$S = Y - T - C$

$I + G - T = Y - T - C$

$50 + 50 - 50 = Y - 50 - (300 + 0.75(Y - 50))$

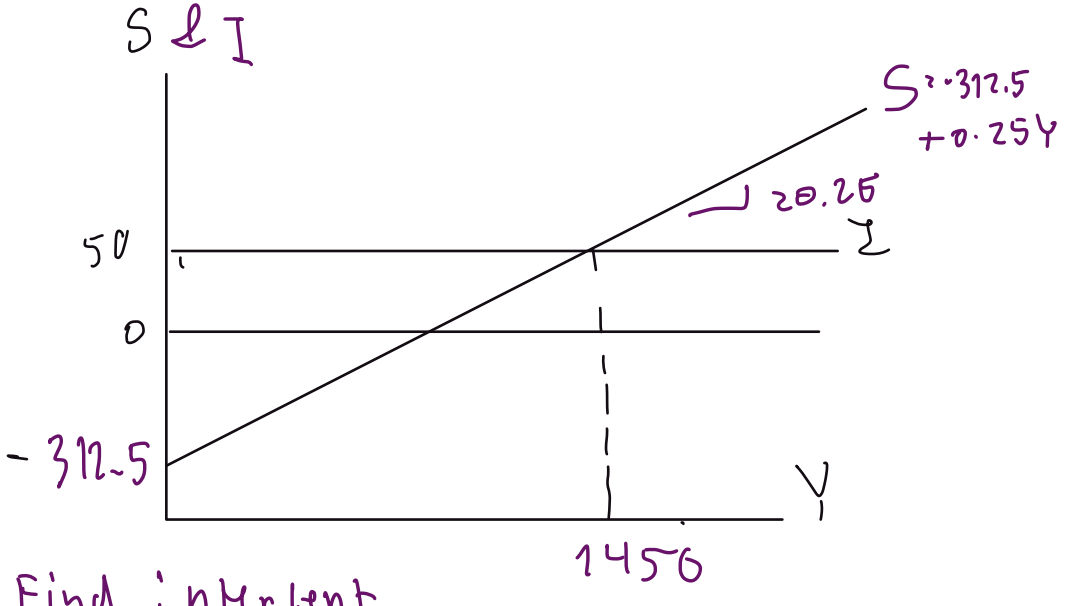
$$50 = Y - 50 - 300 - 0.75Y + 37.5$$

$$50 + 50 + 300 - 37.5 = 0.25Y$$

$$0.25Y = 362.5$$

$$Y^{*} = 1450$$

3.4 Draw the saving/investment curve to show the equilibrium.



Find intercept

Saving function $Y_d = C + S$

$$Y - T = C + S$$

$$Y - 50 = 300 + 0.75(Y - 50) + S$$

$$S = -300 - 0.75Y + 37.5 + Y - 50$$

$$S = -312.5 + 0.25Y$$

3.5 Suppose that the government decides to build more roads, raising government spending by 50 units, but this project is to be financed by the increase in net taxes of 50 units. Use the Y = AE (standard) approach to find the new equilibrium output.

$G \uparrow = 50 + 50 = 100$

$T \uparrow = 50 + 30 = 100$

find new Y^*

$Y = AE$

$AE = C + I + G$

$Y = C + I + G$

$Y = 300 + 0.75(Y - 100) + 50 + 100$

$= 300 + 0.75Y - 75 + 150$

$Y = 375 + 0.75Y$

$Y = 375 + 0.75Y$

$0.25Y = 375$

$Y^* = 1500$

3.6 Use the Balanced-Budget Multiplier (BBM) derived from Question 2.5 to find the new equilibrium output.

$$BBM = \frac{\Delta Y^*}{\Delta G_0} + \frac{\Delta Y^*}{\Delta T_0} = \frac{1-c_1}{1-c_1} = 1$$

when you sum $\frac{\Delta Y}{\Delta G}$ with $\frac{\Delta Y}{\Delta T}$ = will know how Y change

If the government spending and lum-sum tax increase by 1, income will increase 1

Therefore, in order to build more road government need to increase their spending by 50 and lum-sum tax will increase by 50. So the equilibrium will increase 50

$\therefore$ old $Y^* + 50$

$= 1460 + 50$

$= 1500$

4. From $Y = C + I + G + (X - M)$

   where $C = C_0 + C_1(Y - T)$ and $M = M_0 + M_1(Y)$, find

   4.1 Equilibrium Output Y^*

   4.2 $\Delta Y/\Delta I$

   4.3 $\Delta Y/\Delta G$

   4.4 $\Delta Y/\Delta T$

   4.5 Balanced-Budget Multiplier (BBM)

4) $Y = C + I + G + (X - M)$

where $C = C_0 + C_1(Y - T)$ and $M = M_0 + M_1(Y)$

find

4.1 E O Y^*

$$Y = AE$$

$$AE = C + I + G + (X - M)$$

$$Y = C_0 + C_1 Y - C_1 T + I + G + X - (M_0 + M_1 Y)$$

$$= C_0 + C_1 Y - C_1 T + I + G + X - M_0 - M_1 Y$$

$$Y - C_1 Y = C_0 - C_1 T + I + G + X - M_0 - M_1 Y$$

$$Y(1 - C_1) = C_0 - C_1 T + I + G + X - M_0 - M_1 Y$$

$$= \frac{C_0 - C_1 T + I + G + X - M_0 - M_1 Y}{(1 - C_1)}$$

4.2 $\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{slope of AE}}$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - (1 + M_1}$$

4.3 $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - (1 + M_1}$

4.4 $\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - C_1 + M_1}$

4.5 $\frac{\Delta Y^a}{\Delta T} + \frac{\Delta Y^b}{\Delta G} = \frac{1 - MPC}{1 - (1 + M_1}$

5. Assume an open economy with government. The country has the following components of aggregate expenditure.

C = 200 + 0.7(Yd)	I = 75	G = 75
T = 50	X = 50	M = 50 + 0.1Y

5.1 Use the Y = AE approach to find the equilibrium. Is Y = 300 an equilibrium? If it is not, explain the adjustment process towards equilibrium.

5.2 Based on what you have derived in Question 4, calculate the investment, government spending, tax, and balanced-budget multipliers.

5.3 Interpret the value of each of the multipliers.

5.1 $AE = C + I + G + (X - M)$

$Y = AE$

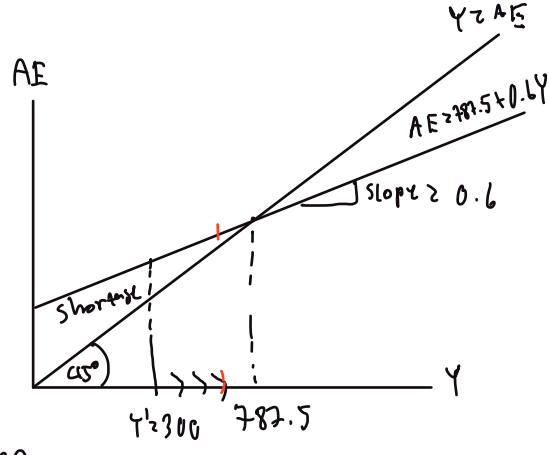
$Y = \underbrace{200 + 0.7(Y - 50)}_{C} + \underbrace{75}_{I} + 75 + (50 - 50 - 0.1Y)$

$Y = 200 + 0.7Y - 35 + 75 + 50 - 50 - 0.1Y + 75$

$Y = 315 + 0.6Y$

$0.4Y = 315$

$Y^* = 787.5$



$Y = 300$ is not an equilibrium

when $Y = 300$, there is a shortage as demand is more than the output which will lead the inventory to decrease and sign for business to increase output to adjust to ward the equilibrium.

5.2. Question 4

Investment multiplier $= \frac{1}{1 - \text{slope of AE}}$

$= \frac{1}{1 - 0.6}$

$= 2.5$

Government spending $= \frac{1}{1 - \text{slope of AE}}$

$= \frac{1}{1 - 0.6}$

$= 2.5$

Tax $= \frac{-MPC}{1 - C_1 + M_1}$

$$= \frac{-0.7}{1-0.7+0.1}$$

$$= \frac{-0.7}{1-0.6}$$

$$= -1.75$$

balanced budget multiplier

$$\frac{\Delta Y^*}{\Delta T} + \frac{\Delta Y^*}{\Delta G} = \frac{1-C_1}{1-C_1+M_1}$$

$$= \frac{1-0.7}{1-0.7+0.1}$$

$$= 0.75$$

Injection multiplier

$$\text{G multiplier} = \frac{1}{1 - \text{slope of AE}}$$

slope of AE = MPC + MPM

$$= \frac{1}{1 - 0.7 + 0.1} = 2.5$$

Tax multiplier

$$= \frac{-MPC}{1 - \text{slope of AE}}$$

slope of AE = MPC + MPM

$$= \frac{-0.7}{1 - 0.7 + 0.1} = -1.75$$

5.3 $\frac{\Delta Y^{\uparrow}}{\Delta I}$: when I increase by 1 unit, output will increase by 2.5

$\frac{\Delta Y^{\uparrow}}{\Delta G}$: when government spending increase by 1 units, output will increase by 2.5

$\frac{\Delta Y^{\downarrow}}{\Delta T}$: when tax increase by 1 unit, output will decrease by 1.75 units

BBM : when goverment and tax are increased equally by 1 unit, output will increase by 0.75

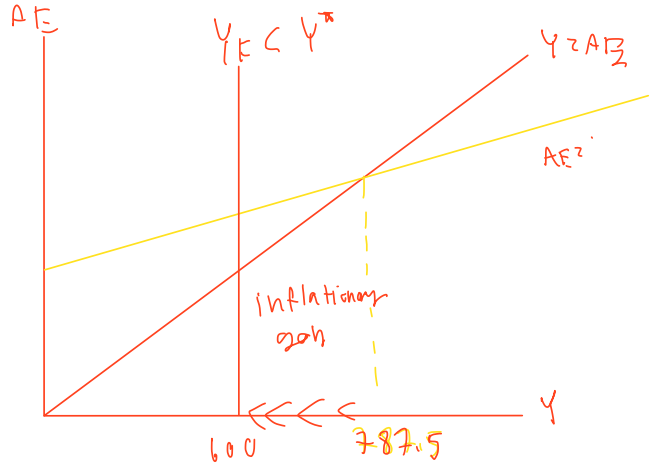
Suppose that the full-employment output (Y_F) is 600;

5.4 What type of output gap is the economy currently experiencing?

5.5 Draw the Keynesian Cross. Identify its slope and intercept. Also, illustrate the output gap.

5.4

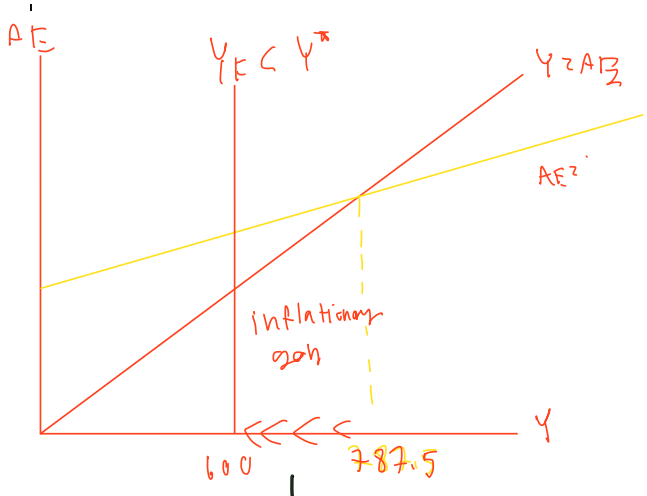
Suppose full employment output (Y_F) is 600



unemployment rate is below the natural rate of unemployment, so we are in the inflationary gap ∴ over employed.

and economy is going to Fix it, so government can use fiscal policy to increase tax and cut government spending so $Y = Y_F$ over capacity.

5.5



$AE = C + I + G + (X - M)$

$= 0.6Y + 315$

output gap = 187.5

5.6 If the government wants to adjust **only its spending (G)**, how much G should be changed?

5.7 If the government wants to adjust **only its net taxes (T)**, how much T should be changed?

5.8 If the government wants to boost **only investment (I)**, how much I should be changed?

5.9 If the government wants to implement a balanced-budget policy, what should the government do with G and T?

5.6

$$\frac{\Delta Y^*}{\Delta G^*} = \frac{1}{1 - \text{slope of AE}}$$

$$\frac{-187.5}{\Delta G} = \frac{1}{1 - 0.6}$$

$$-187.5(0.4) = \Delta G$$

$$\Delta G = -75$$

$\therefore$ G should be decrease by 75 in case to correct the output gap

5.7 Lux

$$\frac{\Delta \Phi^{\#}}{\Delta T} = -1.75$$

$$\frac{-187.5}{\Delta T} = -1.75$$

$$\Delta T = \frac{-187.5}{-1.75}$$

$$\Delta T = 107 \text{ s} \approx 107$$

5.8 Luxmeter

$$\frac{\Delta \Phi^{\#}}{\Delta I} = 2.5$$

$$\frac{-187.5}{\Delta I} = 2.5$$

$$\Delta I = \frac{-187.5}{2.5}$$

$$= -75$$

5.9 wants to implement a balanced budget policy what should the government do

$$\frac{\Delta Y^*}{\Delta T} + \frac{\Delta Y^*}{\Delta G} = 0.75$$

$$\frac{-187.5}{0.75} = \Delta G + \Delta T$$

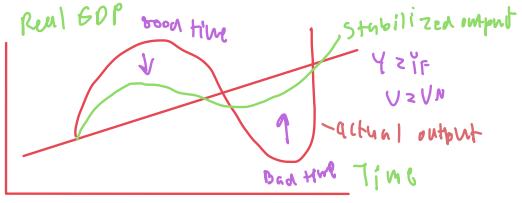
$$-250 = \Delta G + \Delta T$$

decrease both by 250

6. Explain the role of Import as an automatic stabilizer. If the government wants to further stabilize the economy, is there anything that the government can do with its tax system? Explain.

Atomatic Stabilizer = component in AE to stabilize the GDP
import / income tax are automatic stabilizer

Role of automatic stabilizer is to reduce the fluctuation of economy



During good time → high Y, AE
so the gov raise tax and import to reduce people income(Y) which help to slow down the economy during peak time.

During Bad time → low Y, AE
so the gov. reduce tax and import to increase people income(Y) which helps to boost the economy during the recession

7. Let S = -200 + 0.5Y and I = 50, be the saving function and investment.

7.1 Use the saving/investment approach to find the equilibrium output.

7.2 Find the equilibrium saving. (Hint: substitute Y* into S)

Suppose people decide to save more, increasing autonomous saving by 100.

7.3 Use the saving/investment approach to find the new equilibrium output.

7.4 Find the new equilibrium saving. (Hint: substitute new Y* into S)

7.5 Comment on your result.

7.1 let $S = -200 + 0.5Y$, $I = 50$

$S = I$

7.1 $S = I$

$50 = -200 + 0.5Y$

$250 = 0.5Y$

$Y^* = 500$

7.2 Equilibrium of saving

$S = -200 + 0.5(500)$

$S^* = -200 + 250$

$S^* = 50$

7.3 saving +100 = new saving

new $S = -200 + 0.5Y + 100$

$= -100 + 0.5Y$

$S = I$

$-100 + 0.5Y = 50$

$\frac{1}{2} Y = 150$

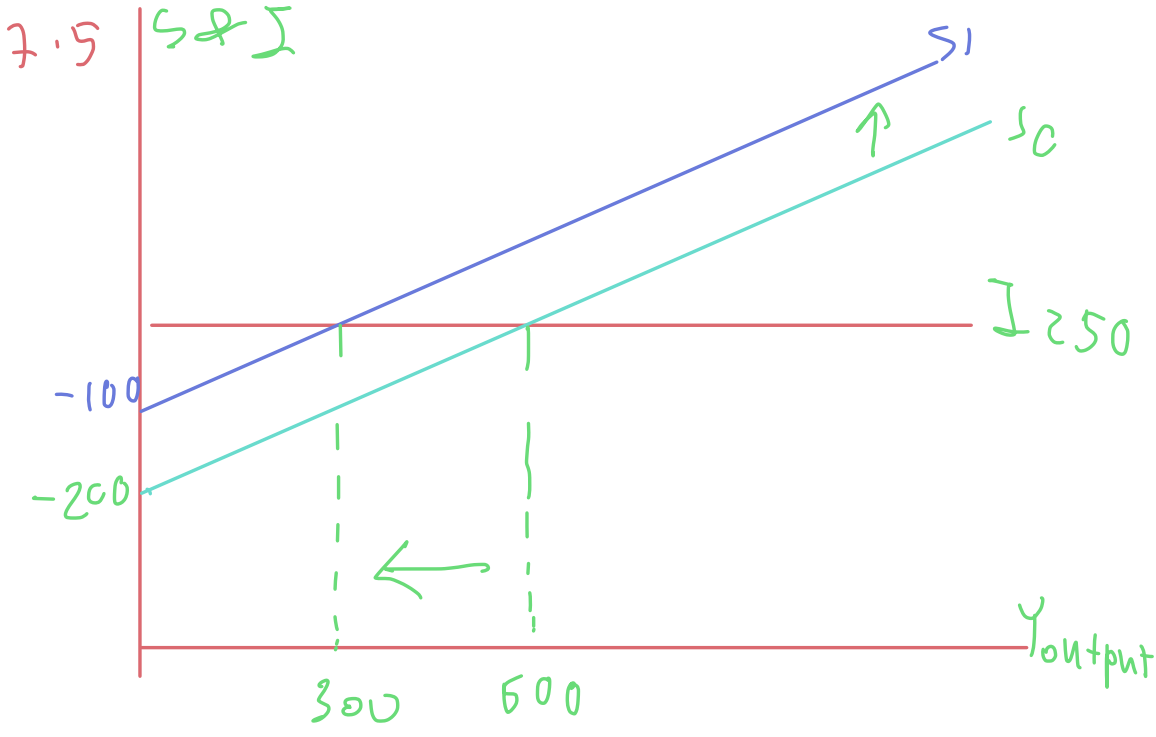
$Y^* = 300$

7.4) $S = -100 + 0.5Y^*$

$= -100 + 0.5(300)$

$= -100 + 150$

$S^* = 50$



paradox of thrift : people save more
→ economy slow down
→ less income

people save more by 100
output decrease by 200