Answer

1.

1.1. Gov. multiplier = 5 ; $\Delta G = 5$

$\Rightarrow \frac{\Delta Y}{5} = 5 \Rightarrow \Delta Y = 25$

1.2. Tax multiplier = -3, $\Delta Y = -9$

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

1.3. $\Delta Y = 10$, $\Delta I = 2$

$\Rightarrow$ Investment multiplier $= \frac{10}{2} = 5$

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

2.1. Equilibrium output Y^*

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

$= C_0 + C_1Y - C_1T + I + G$

$Y - C_1Y = C_0 - C_1T + I + G$

$(1 - C_1)Y = C_0 - C_1T + I + G$

$$Y = \frac{C_0 - C_1T + I + G}{1 - C_1} = \frac{1}{1 - C_1}(C_0 - C_1T + I + G)$$

2.2. $\frac{\Delta Y}{\Delta I} = \frac{1}{1 - \text{Slop of AE}}$

$AE = C + I + G = C_0 + C_1(Y-T) + I + G = C_0 + C_1Y - C_1T + I + G$ ← slope of AE

$\Rightarrow \frac{\Delta Y}{\Delta I} = \frac{1}{1 - C_1}$

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

$AE = C + I + G = C_0 + C_1(Y-T) + I + G = C_0 + C_1Y - C_1T + I + G$ ← slope of AE

$\Rightarrow \frac{\Delta Y}{\Delta G} = \frac{1}{1 - C_1}$

2.3. $\frac{\Delta Y}{\Delta T} = \frac{-C_1}{1 - \text{Slope of AE}}$

$AE = C + I + G = C_0 + C_1(Y-T) + I + G = C_0 + C_1Y - C_1T + I + G$ ← slope of AE

$\Rightarrow \frac{\Delta Y}{\Delta T} = \frac{-C_1}{1 - C_1}$

2.5. $BBM = \frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T} = \frac{1}{1 - C_1} + \frac{-C_1}{1 - C_1} = \frac{1 - C_1}{1 - C_1}$

BBM tells how much output change when both G spending & T change at the same amount.

3.

3.1. Find equilibrium output

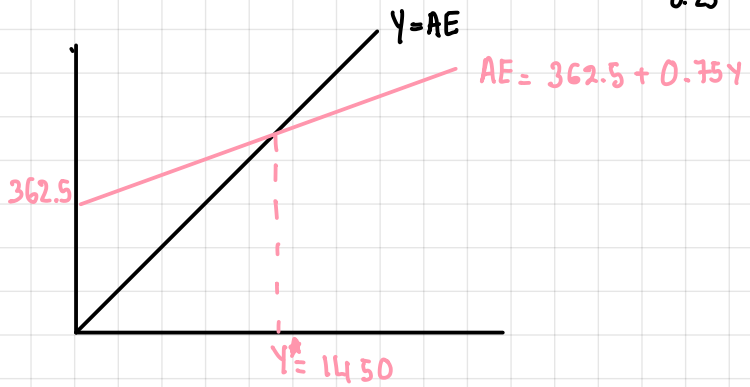
$AE = C + I + G$

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

$= 400 + 0.75Y - 37.5 = 362.5 + 0.75Y$

$Y = AE \Leftrightarrow Y = 362.5 + 0.75Y$

$0.25Y = 362.5 \Rightarrow Y = \frac{362.5}{0.25} = 1450$



$Y = \underbrace{C+S}_{Y-T} \Rightarrow S = Y - C$

3.3 Leakage = injection

$S + T = I + G$

$Y - T = C + S$

$Y - C = S + T$

$Y - C = I + G = 50 + 50 = 100$

$Y = 100 + 300 + 0.75(Y-50) = 369.5 + 0.75Y$

$Y = \frac{362.5}{0.25} = 1450$

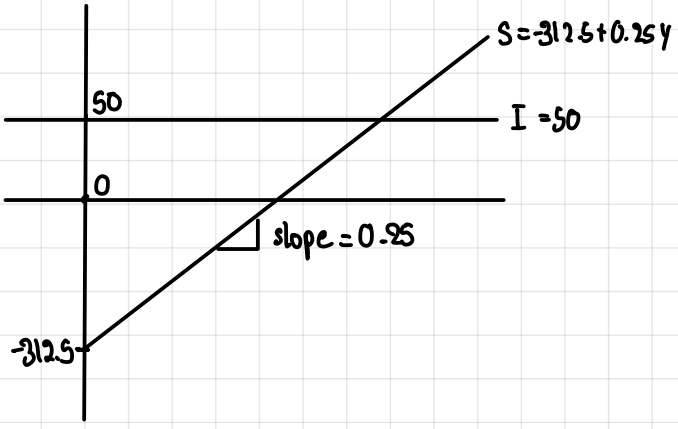
3.4. Draw saving graph

$Yd = C + S = Y - T$

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

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

$S = 0.25Y - 312.5$



3.5 $Y = AE$

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

$= 375 + 0.75Y$

$Y = AE \Leftrightarrow Y = 375 + 0.75Y$

$0.25Y = 375$

$Y^* = 1500$

3.6 From 2.5 $BBM = \frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta G} = 1$

∴ if gov. raise tax by 1 & increase spending by 1

Y^* will increase by 1.

If gov raise tax and increase spending by 50 ⇒ Y^* will increase by 50

Old $Y^* = 1450 + 50 = 1500 =$ New Y^*

4. $Y = C + I + G + X - M$, $C = C_0 + C_1(Y - T)$ and $M = M_0 + M_1(Y)$

$AE = C_0 + C_1Y - C_1T + I + G + X - M_0 - M_1Y$

$Y = C_0 - C_1T + I + G + X - M_0 + (C_1 - M_1)Y$

$Y - (C_1 - M_1)Y = C_0 - C_1T + I + G + X - M_0$

$Y(1 - (C_1 - M_1)) = C_0 - C_1T + I + G + X - M_0$

$$Y = \frac{C_0 - C_1T + I + G + X - M_0}{1 - C_1 + M_1} = \frac{1}{1 - C_1 + M_1}(C_0 - C_1T + I + G + X - M_0)$$

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

$AE = C_0 + C_1Y - C_1T + I + G + X - M_0 - M_1Y$

$AE = C_0 - C_1T + I + G + X - M_0 + (C_1 - M_1)Y$ (slope of AE)

$\Rightarrow \frac{\Delta Y}{\Delta I} = \frac{1}{1 - C_1 + M_1}$

4.3 $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope of AE}}$

$AE = C_0 + C_1Y - C_1T + I + G + X - M_0 - M_1Y$

$AE = C_0 - C_1T + I + G + X - M_0 + (C_1 - M_1)Y$ (slope of AE)

$\Rightarrow \frac{\Delta Y}{\Delta G} = \frac{1}{1 - C_1 + M_1}$

4.3. $\frac{\Delta Y}{\Delta T} = \frac{-C_1}{1 - \text{slope of AE}}$

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

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

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

4.5 $BBM = \frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T} = \frac{1}{1 - C_1 + M_1} + \frac{-C_1}{1 - C_1 + M_1} = \frac{1 - C_1}{1 - C_1 + M_1}$

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

5.1. Find equilibrium (by $Y = AE$)

$AE = 200 + 0.7(Y - 50) + 75 + 75 + 50 - 50 - 0.1Y$

$= 315 + 0.6Y$

$Y = AE \Rightarrow Y = 315 + 0.6Y$

$0.4Y = 315 \Rightarrow Y = \frac{315}{0.4} = 787.5$

$Y = 300$ is not an equilibrium. If $Y = 300$, there will be shortage, and it needs adjustment process toward equilibrium. Y can move to Y^* by increasing production or government lower taxes and increase its spending.

5.2. $\frac{\Delta Y}{\Delta I} = \frac{1}{1 - C_1 + M_1} = \frac{1}{1 - 0.7 + 0.1} = \frac{1}{0.4} = 2.5$

$\frac{\Delta Y}{\Delta G} = \frac{1}{1 - C_1 + M_1} = \frac{1}{1 - 0.7 + 0.1} = \frac{1}{0.4} = 2.5$

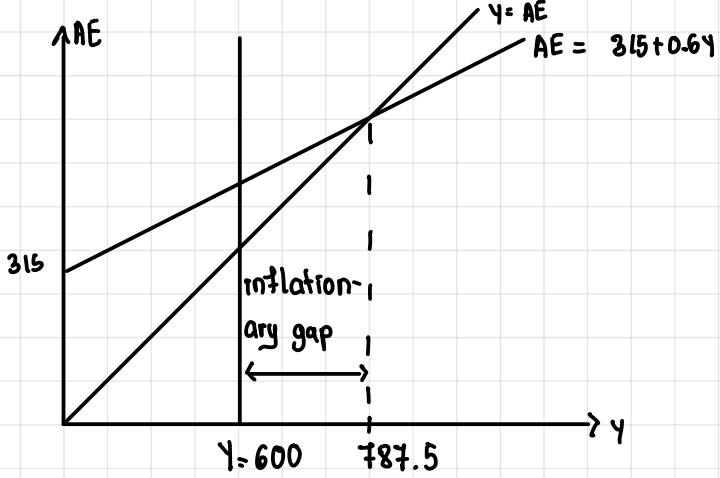
$\frac{\Delta Y}{\Delta T} = \frac{-C_1}{1 - C_1 + M_1} = \frac{-0.7}{1 - 0.7 + 0.1} = -1.75$

5.3. Interpret multiplier

- Investment multiplier: If investment changes by 1 unit, equilibrium output changes by 2.5
- Government multiplier: If government spending changes by 1 unit, equilibrium output changes by 2.5.
- Tax multiplier: If tax changes by 1 unit, equilibrium output changes by -1.75.

5.4. If full-employment output (Y_F) = 600, the economy currently is experiencing inflationary gap.

5.5.



5.6. If governments wants to correct the output gap by moving economy to the full-employment level and wants to adjust only its spending G:

Government multiplier : $\frac{\Delta Y}{\Delta G} = 2.5$; $\Delta Y = 600 - 787.5 = -187.5$

$$\Rightarrow \Delta G = \frac{\Delta Y}{2.5} = \frac{-187.5}{2.5} = -75$$

5.7. If gov. wants to adjust only taxes

$$\frac{\Delta Y}{\Delta T} = -1.75 \Rightarrow \frac{-\Delta Y}{-1.75} = \Delta T \Rightarrow \frac{-187.5}{-1.75} = 107.14$$

5.8. If gov. want to boost only investment

$$\frac{\Delta Y}{\Delta I} = 2.5 \Rightarrow \Delta I = \frac{\Delta Y}{2.5} = \frac{-187.5}{2.5} = -75$$

5.9. Using BBM:

$$\frac{\Delta Y}{\Delta G} + \frac{\Delta Y}{\Delta T} = 2.5 - 1.75 = 0.75$$

If G, T ↑ by 1 unit, ΔY ↑ by 0.75

If ΔY ↓ by 187.5 ⇒ G & T ↓ by 250

7.1 $S = -200 + 0.5Y$ and $I = 50$

$S = I$

$-200 + 0.5Y = 50$

$$0.5Y = 250 \Rightarrow Y^* = \frac{250}{0.5} = 500$$

7.2. Find equilibrium saving

$S = -200 + 0.5Y = -200 + 0.5(500) = 50$

7.3. $S = -200 + 0.5Y + \underline{100}$ (↗ save more)

$-100 + 0.5Y = 50 \Rightarrow 0.5Y = 150 \Rightarrow Y^* = \frac{150}{0.5} = 300$

Equilibrium saving (new)

$S = -100 + 0.5Y = -100 + 0.5(300) = 50$

When people save more, output decrease

Economy slow down, less income to people.