

- 1.1) 25 ✓
- 1.2) 3 ✓
- 1.3) 5 ✓

2.1)  $AE = C + I + G$   
 $Y = AE$   
 $Y^* = C + I + G$   
 $Y^* = C_0 + C_1(Y-T) + I + G$   
 $Y^* = C_0 + C_1Y - C_1T + I + G$   
 $Y(1 - C_1) = C_0 - C_1T + I + G$   
 $Y = \frac{1}{(1 - C_1)} C_0 - C_1T + I + G$

2.2)  $\frac{1}{1 - \text{slope AE}}$  ✓

2.3)  $\frac{1}{1 - \text{slope AE}}$  ✓

2.4)  $\frac{-MPC}{1 - \text{slope AE}}$  ✓

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

2.6) a change in aggregate output when both  $G$  &  $T$  increase by 1 unit ✓

$$\begin{aligned}
 AE &= C + I + G \\
 &= C_0 + C_1(Y-T) + I + G \\
 &= (C_0 - C_1Y + I + G) + C_1Y \\
 &\quad \downarrow \\
 &\quad \text{slope of AE}
 \end{aligned}$$

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

3.3)  $-300 + (1 - 0.75)(Y - 50) + 50 = 100$

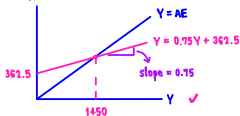
$0.25Y = 362.5$

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$Y = 1450$  ✓

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3.2) AE



saving function;  $Y_d = C + S \rightarrow Y - T = C + S$

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

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

3.4) AE



$0.25Y = 375$

$Y = 1500$  ✓

3.6)  $\frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = \frac{1 - C_1}{1 - C_1} = 1$  when you sum, you will know how  $Y$  change

If the government spending & lump-sum tax increase by 1, income will increase 1

∴ In order to build more road, government increase their spending by 50, and lump-sum tax increase by 50. So, the  $Y^*$  will increase 50.  $\Rightarrow$  old  $Y^* + 50 = 1450 + 50 = 1500$

4.

$$\begin{aligned}
 4.1) \quad Y &= C_0 + C_1(Y-T) + I + G + X - (M_0 + M_1 Y) \\
 Y &= C_0 + C_1 Y - C_1 T + I + G + X - M_0 - M_1 Y \\
 Y - C_1 Y + M_1 Y &= C_0 - C_1 T + I + G + X - M_0 \\
 Y(1 - C_1 + M_1) &= C_0 - C_1 T + I + G + X - M_0 \\
 Y^* &= \frac{C_0 - C_1 T + I + G + X - M_0}{1 - C_1 + M_1}
 \end{aligned}$$

$$4.2) \frac{1}{1 - C_1 + M_1}$$

$$4.3) \frac{1}{1 - C_1 + M_1}$$

$$4.4) \frac{-C_1}{1 - C_1 + M_1}$$

$$4.5) \frac{1 - C_1}{1 - C_1 + M_1}$$

5.

$$5.1) Y = AE$$

$$Y = 300 + 0.7(Y - 50) + 75 + 75 + 50 - 50 - 0.1Y$$

$$Y = 0.6Y + 315$$

$$0.4Y = 315$$

$$Y^* = 787.5 \quad \checkmark$$

$AE > Y$  (inventories  $\downarrow$  : firm  $\uparrow$  in production to move to  $Y^*$ )

$$5.2) \frac{\Delta Y^*}{\Delta I} = \frac{\Delta Y^*}{\Delta G} = \frac{1}{1 - C_1 + M_1} = \frac{1}{1 - 0.7 + 0.1} = 2.5 \quad \checkmark$$

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

$$BBM = \frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = 2.5 + (-1.75) = 0.75 \quad \checkmark$$

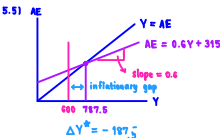
$$5.3) \frac{\Delta Y^*}{\Delta I} \rightarrow \text{when } I \uparrow \text{ by 1 unit, } Y \text{ will } \uparrow \text{ by 2.5} \quad \checkmark$$

$$\frac{\Delta Y^*}{\Delta G} \rightarrow \text{when } G \uparrow \text{ by 1 unit, } Y \text{ will } \uparrow \text{ by 2.5} \quad \checkmark$$

$$\frac{\Delta Y^*}{\Delta T} \rightarrow \text{when } T \uparrow \text{ by 1 unit, } Y \text{ will } \downarrow \text{ by 1.75} \quad \checkmark$$

$$BBM \rightarrow \text{when } G \text{ \& } T \uparrow \text{ by 1 unit, } Y \text{ will } \uparrow \text{ by 0.75} \quad \checkmark$$

5.4) Inflationary gap ( $Y_f < Y^*$ )  $\checkmark$



$$5.6) \frac{\Delta Y^*}{\Delta G} = 2.5 \rightarrow \Delta G = \frac{-187.5}{2.5} = -75 \quad \checkmark$$

$$5.7) \frac{\Delta Y^*}{\Delta T} = -1.75 \rightarrow \Delta T = \frac{-187.5}{-1.75} = 107.142 \quad \checkmark$$

$$5.8) \frac{\Delta Y^*}{\Delta I} = 2.5 \rightarrow \Delta I = \frac{-187.5}{2.5} = -75 \quad \checkmark$$

$$5.9) \frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = 0.75 \rightarrow BBM = \frac{-187.5}{0.75} = -250 \quad \checkmark$$

6. Automatic stabilizer : component in AE to stabilize the GDP

import / income-tax are small automatic stabilizer (when economy is bad)

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  $S$ )

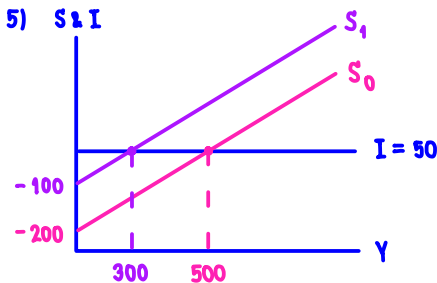
7.5 Comment on your result.

$$\begin{aligned}
 1) \quad S &= I \\
 -200 + 0.5Y &= 50 \\
 0.5Y &= 250 \\
 Y^* &= 500 \# \checkmark
 \end{aligned}$$

$$\begin{aligned}
 2) \quad S &= -200 + 0.5Y \\
 &= -200 + 0.5(500) \\
 &= 50 \# \checkmark
 \end{aligned}$$

$$\begin{aligned}
 3) \quad S &= I \\
 -100 + 0.5Y &= 50 \\
 0.5Y &= 150 \\
 Y^* &= 300 \# \checkmark
 \end{aligned}$$

$$\begin{aligned}
 4) \quad S &= -100 + 0.5Y \\
 &= -100 + 0.5(300) \\
 &= 50 \# \checkmark
 \end{aligned}$$



Paradox of thrift : people save more  $\rightarrow$  economy slow down  $\rightarrow$  less income to people ( $Y \downarrow$ )

$\rightarrow$  due to less money change hand in economy

people save more by 100 ( $S_0 \rightarrow S_1$ )

output decrease by 200 (500  $\rightarrow$  300)