Exercise 6

IS-LM Model

1. The IS-LM Model is a general equilibrium model, which means that……there is a common price that clears to two or more markets……
   There are………markets, which are……goods market & money market.
   The price that clears these markets is……interest rate……
   The IS curve represents a..negative.....relationship between ……interest rate……and……output……This is because……higher interest rate discourages investors from interesting and decrease in output……
   The LM curve represents a..positive.....relationship between ……interest rate……and……output……This is because……higher income → people have more demand for money → interest rate increase……
   Each point on the IS curve is an equilibrium in the..goods.....market.
   Therefore, we have the equilibrium condition: ……Y = AE……
   Each point on the LM curve is an equilibrium in the..money.....market.
   Therefore, we have the equilibrium condition: ……MS = Md……

2. Cetaris Paribus (other things equal), how will each variable affect each curve – shift (to which direction?) or movement?

Variable	IS Curve	LM Curve
i↑	movement	movement
G↓	shift left	-
T↓	shift right	-
G&T↑ equally	shift right	-
M↓	-	shift left
P↓	-	shift right

3. Explain, together with diagrams, how we can derive the IS curve from Keynesian Cross, and how we can derive the LM curve from the money market.

4. Assume a closed economy with the government. The economy has the following parameters:
   $C = C_0 + C_1(Y - T)$ $\quad I = I_0 - I_1 \cdot i$ $\quad G = G_0$ $\quad T = T_0$
   $L(i, Y) = L_Y \cdot Y - L_i \cdot i$ $\quad M = M_0$ $\quad P = P_0$
   Answer the following questions.
   4.1 What are I_1, L_Y, and L_i?
   4.2 Why are I_1 and L_i negative?
   4.3 Derive the IS equation that shows how i and Y are related.

(Hint: Start with the equilibrium condition Y = AE. Then, substitute relevant variables into the expression. Lastly, rearrange i to the LHS and everything else on the RHS.)

4.4 Find the slope of the IS curve.

(Hint: The coefficient before Y is the slope of IS.)

4.5 Derive the LM equation that shows how i and Y are related.

(Hint: Start with the equilibrium condition Md = Ms. Then, substitute relevant variables into the expression. Lastly, rearrange i to the LHS and everything else on the RHS.)

4.6 Find the slope of the LM curve.

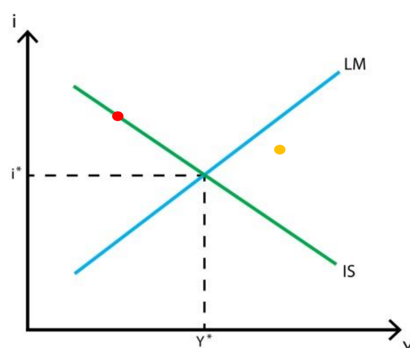
(Hint: The coefficient before Y is the slope of LM.)

5. From Question 4.4, we can see that the slope of IS curve depends on two factors. Explain how each of these factors affects the slope of the IS curve. We also can see that the slope of LM curve depends on two factors. Explain how each of these factors affects the slope of the LM curve.

6. What is the Crowding-Out Effect?
Suppose that the government increases its spending, i.e. expansionary fiscal policy. Use the IS-LM diagram to explain how the economy moves to the new general equilibrium and the crowding-out effect.

7. Suppose the central bank decreases its money supply, i.e. contractionary monetary policy. Use the IS-LM diagram to explain how the economy moves to the new general equilibrium.

8. Use the graph below to answer the following questions.



8.1 At the **Red** point, which market is in equilibrium, and which is not?

8.2 Explain how the goods and money markets at the **Orange** point will adjust towards the general equilibrium (Y*, i*).

9. The government is worried about the effectiveness of its policies. You are to advise which policy – fiscal or monetary – should be used in each of the following cases.
   9.1 Consumers have high MPC.
   9.2 Investment is NOT sensitive to changes in interest rate.
   9.3 Money demand is very sensitive to changes in interest rate.
   9.4 Money demand is very sensitive to changes in income (Y).

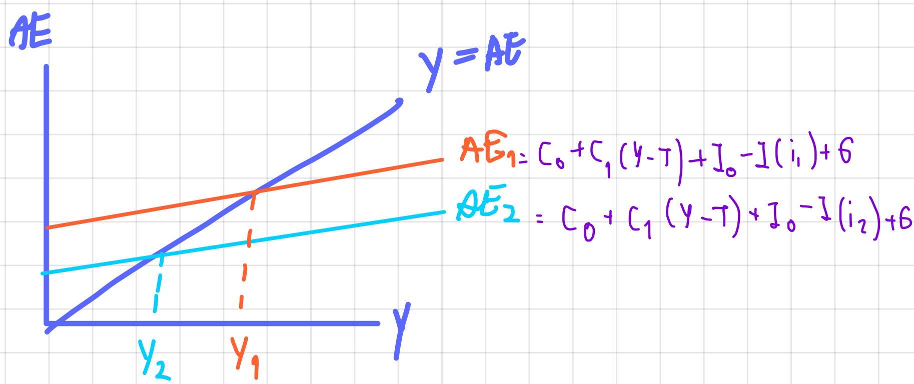
10. Assume a closed economy with the government. The economy has the following parameters:

C = 100 + 0.5(Yd)	I = 80 – 100(i)	G = 40	T = 40
L(i, Y) = 0.5(Y) – 200(i)		M = 400	P = 2

<u>Answer the following questions.</u>

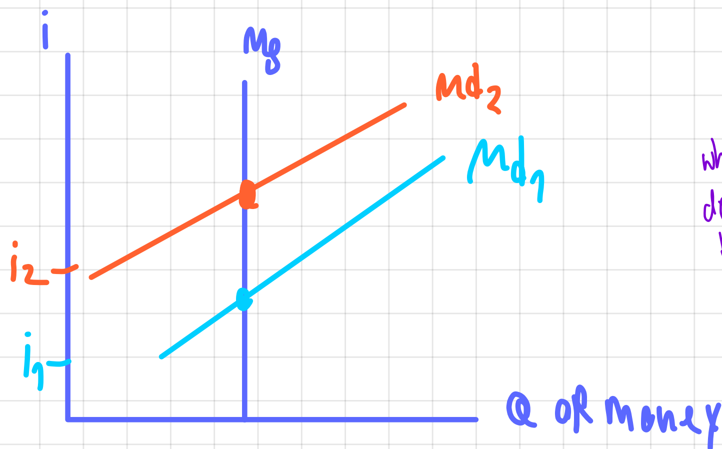
10.1 Derive the IS equation.
10.2 Derive the LM equation.
10.3 Find the general equilibrium output and interest rate.

3) G market



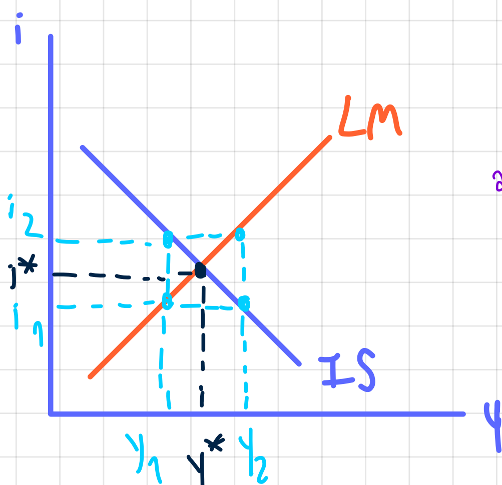
when interest increase, the investment will be decrease.

M market



when interest rate increase, people will decrease demand of cash be cause they'll by the bond.

IS-LM curve



The ISLM curve showns the interception of money market and goods market at output and interest rate are equilibrium.

IS shows the relationship in goods market between int. rate and output so when int. rate increase output will decrease

Lm shows relationship in money market.

4.1) I_1 is sensitivity of Investment to change in Interest rate
L_y is sensitivity of money demand to change in Income
L_i is sensitivity of money demand to change in interest.

4.2) I_1 is negative because when Interest rate increase, it'll discourage Investment.
L_i is negative because when interest rate increase, people will demand less money.

4.3) $Y = AE$

$Y = C + I + G$

$Y = C_0 + C_1(Y - T) + I_0 - I_1(i) + G$

$Y = C_0 + C_1 Y - C_1 T + I_0 - I_1(i) + G$

$I_1(i) = C_0 + C_1 Y - C_1 T + I_0 + G - Y$

$$i = \frac{C_0 + C_1 Y - C_1 T + I_0 + G - Y}{I_1}$$

4.4) $\frac{\Delta i}{\Delta Y}$ = slope of IS

$$\frac{\Delta i}{\Delta Y} = \frac{C_1 - Y}{I_1} = \frac{-1}{I_1 m}$$

4.5) $M_d = M_s$

$L(Y_1 \cdot i) = \frac{M}{P}$

$L_y(Y) - L_i(i) = \frac{M}{P}$

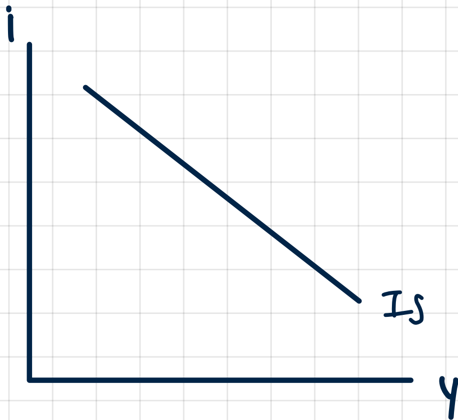
$L_i(i) = L_y(Y) - \frac{M}{P}$

$i = \frac{L_y(Y)}{L_i} - \frac{M}{P}\left(\frac{1}{L_i}\right)$

4.6) Slope of LM $= \frac{\Delta i}{\Delta Y} = \frac{L_y}{L_i}$

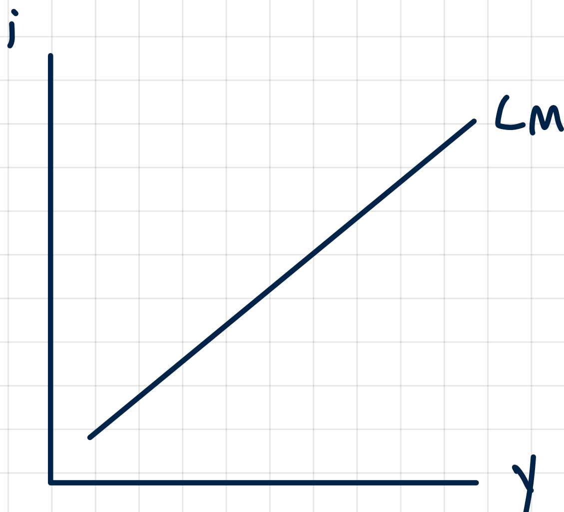
5)

slope of IS curve $= \frac{-1}{I_1 m}$



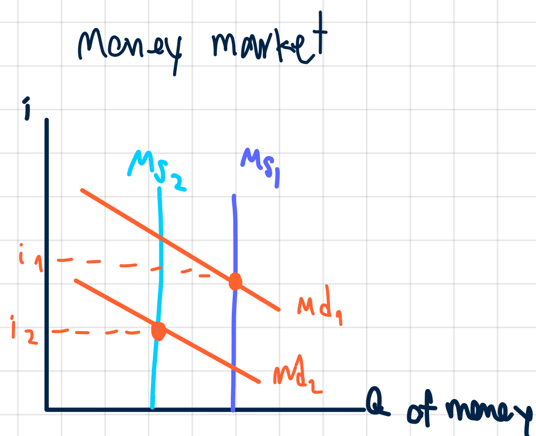
when I_1 or m increase for a unit the IS deerease for 1 unit.

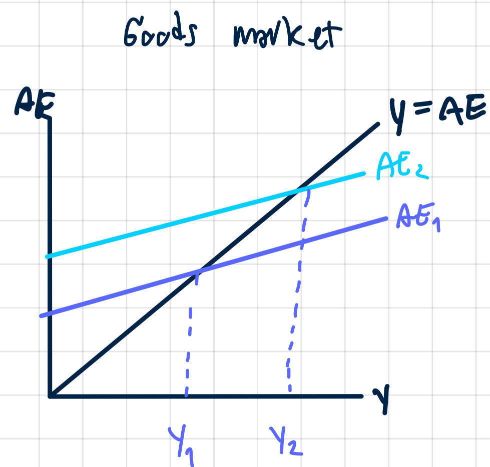
slope of LM curve $= \frac{L_y}{L_i}$

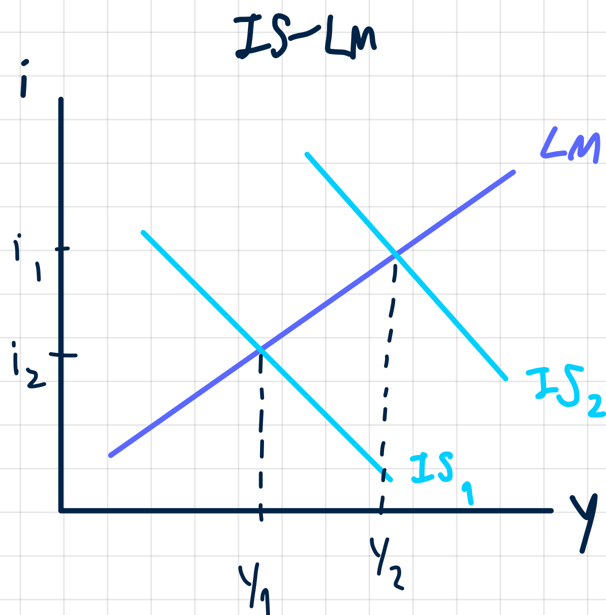


when L_i increase for 1 unit L_y will be increase for 1 unit

7) central bank decrease money supply







Contrationary monetary policy

GM : $i\downarrow \rightarrow I\uparrow \rightarrow AE\uparrow \rightarrow Y\uparrow$

MM : $Y\uparrow \rightarrow M_d\uparrow \rightarrow M_s\downarrow$

10.1)

$$AE = Y = C_0 + C_1(Y-T) + I_0 - I_1(i) + G$$

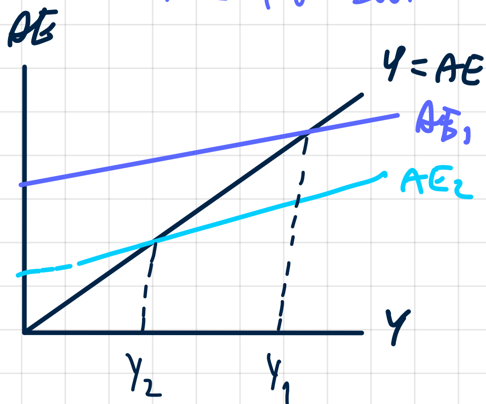
$$Y = 100 + 0.5(Y-40) + 80 - 100(i) + 40$$

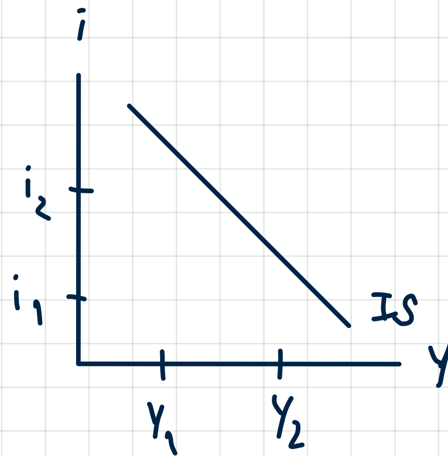
$$Y = 220 + 0.5Y - 20 - 100(i)$$

$$100(i) = 200 - 0.5Y$$

$$0.5Y = 200 - 100i$$

$$Y = 400 - 200i$$





10.2)

$$M_s = M_d$$

$$\frac{M}{P} = L(Y, i)$$

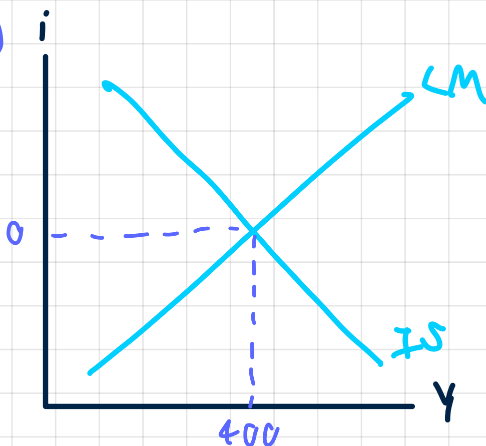
$$\frac{M}{P} = L_Y(Y) - L_i(i)$$

$$\frac{400}{2} = 0.5(Y) - 200(i)$$

$$400 = Y - 400i$$

$$Y = 400 + 400i$$

10.3)



$$IS = LM$$

$$\cancel{400} - 200i = \cancel{400} + 400i$$

$$0 = 600i$$

$$\therefore i = 0$$