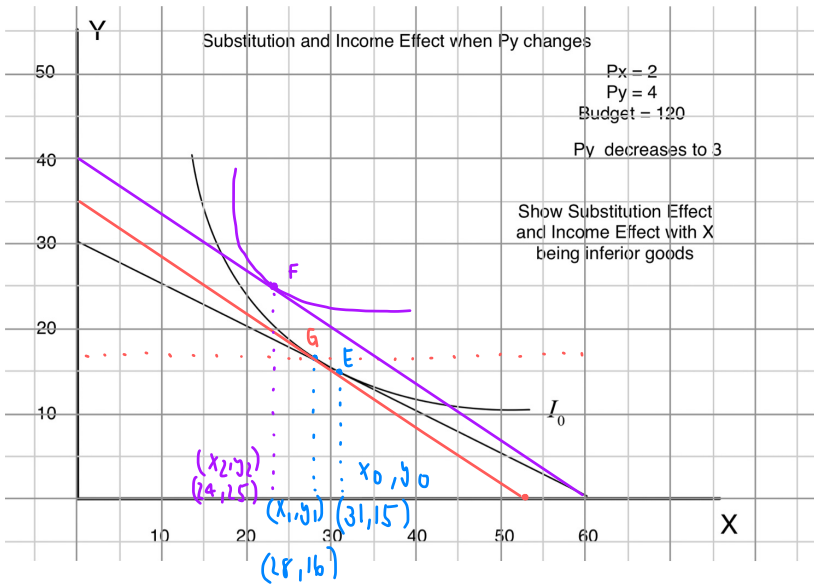


1)



• Equilibrium changes from E to F meaning that P_y decreases consuming less of X and more of Y, indicating that X and Y are substitute product

• Imaginary budget line on the same indifference curve

$$S.E. = \Delta X = x_1 - x_0 = 28 - 31 = -3 < 0$$

$$\Delta Y = y_1 - y_0 = 16 - 15 = 1 > 0$$

• moving the imaginary budget line up

$$I.E = \Delta X = x_2 - x_1 = 24 - 28 = -4 < 0$$

$$\Delta Y = y_2 - y_1 = 25 - 16 = 9 > 0$$

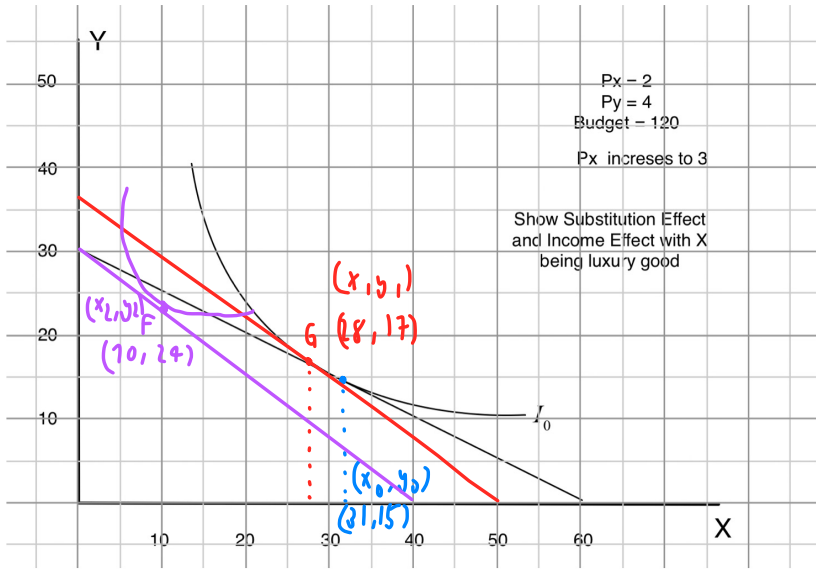
• T.E = S.E + I.E

$$= \Delta X = x_2 - x_0 = 24 - 31 = -7$$

$$\Delta Y = y_2 - y_0 = 25 - 15 = 10$$

less real income
consume less of X,
and more of Y
 \therefore X is inferior,
Y is luxury

2)



• Equilibrium changes from E to F meaning that P_x increases consuming less of X and more of Y, indicating that X and Y are substitute product

• Imaginary budget line on the same indifference curve

$$S.E. = \Delta X = x_1 - x_0 = 28 - 31 = -3 < 0$$

$$\Delta Y = y_1 - y_0 = 17 - 15 = 2 > 0$$

• moving the imaginary budget line up

$$I.E. = \Delta X = x_2 - x_1 = 10 - 28 = -18 < 0$$

$$\Delta Y = y_2 - y_1 = 24 - 17 = 7 > 0$$

• T.E = S.E + I.E

$$= \Delta X = x_2 - x_0 = 10 - 31 = -21$$

$$\Delta Y = y_2 - y_0 = 24 - 15 = 9$$

less real income
 consume less of X,
 and more of Y
 \therefore X is luxury,
 Y is inferior