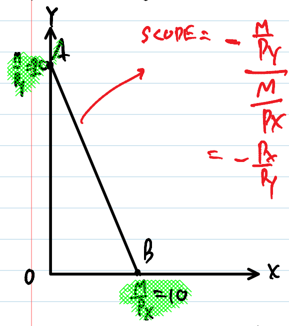
WEEK 10 ('22.10.13)

BUDGET LINES (CONTINUED)



SLOPE $= -\dfrac{\frac{M}{P_Y}}{\frac{M}{P_X}} = -\dfrac{P_X}{P_Y}$

BUDGET LINE EQUATION:

$P_X X + P_Y \cdot Y = M$

OR

$\boxed{Y = \frac{M}{P_Y} - \frac{P_X}{P_Y} \cdot X} \Rightarrow Y = 20 - 2X$

OPPORTUNITY COST OF X IN TERM OF Y. = SLOPE OF BL

IF $X=0$, $Y = \frac{M}{P_Y}$ ⇒ MAX. AMOUNT OF Y THE BUYER CAN BUY IF HE BUYS NO X.

IF $Y=0$, $0 = \frac{M}{P_Y} - \frac{P_X}{P_Y} \cdot X$

$X = \frac{M}{P_Y} \cdot \frac{P_Y}{P_X}$

$\therefore X = \frac{M}{P_X}$ ⇐ MAX. AMOUNT OF X THE CONSUMER CAN BUY IF HE BUYS NO Y.

$M = 1000$, $P_X = 100$, $P_Y = 50$

$\frac{M}{P_X} = \frac{1000}{100} = 10$

$\frac{M}{P_Y} = \frac{1000}{50} = 20$

- SLOPE OF BUDGET LINE $= -\dfrac{P_X}{P_Y}$

EX: $P_X = 100$, $P_Y = 50$, SLOPE OF BL $= -\frac{100}{50} = -2$

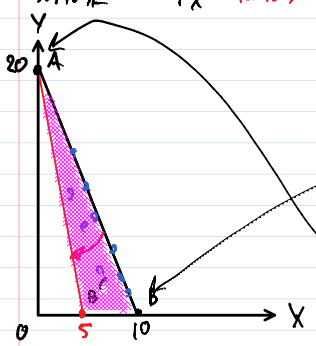
-2 IMPLIES THAT IF HE WANTS TO BUY AN EXTRA UNIT OF GOOD X (MOVIES), HE MUST FORGO 2 UNITS OF ANOTHER GOOD (GOOD Y)!

-2 = OPP. COST OF HAVING AN ADDITIONAL UNIT OF X IN TERM OF FORGONE UNIT(S) OF Y.

$\boxed{P_X, P_Y, M}$

NOW, IF P_X RISES, WHAT HAPPENS TO THE BUDGET LINE?

SUPPOSE P_X RISES FROM 100 TO 200 BAHT/TICKET.



OLD SITUATION	NEW SITUATION
$M = 1000$	$M = 1000$
$P_X = 100$	$P_X' = 200$
$P_Y = 50$	$P_Y = 50$
$\frac{M}{P_X} = \frac{1000}{100} = 10$	$\frac{M}{P_X'} = \frac{1000}{200} = 5$ ☹
$\frac{M}{P_Y} = \frac{1000}{50} = 20$	$\frac{M}{P_Y} = \frac{1000}{50} = 20$
$-\frac{P_X}{P_Y} = \frac{-100}{50} = -2$	$-\frac{P_X'}{P_Y} = -\frac{200}{50} = -4$!

FACT #1 WHEN P_X RISES FROM 100 TO 200 BAHT, THE BUDGET LINE SWINGS (ROTATES/PIVOTS) INWARD FROM AB TO AB'. THE BUDGET LINE BECOMES STEEPER.

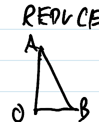
OLD SLOPE (LINE AB) $= -2$

NEW SLOPE (LINE AB') $= -4$

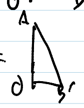
IT IMPLIES THAT "OPPORTUNITY COST OF OBTAINING AN EXTRA UNIT OF GOOD X (MOVIES) IS INCREASING FROM 2 TO 4!

FACT #2 INCREASE IN P_X REDUCES HIS BUDGET SET.

B/F: OLD BUDGET SET =



A/F: NEW BUDGET SET =



(SMALLER)

SOME BASKETS (IN PINK REGION) ARE NO LONGER

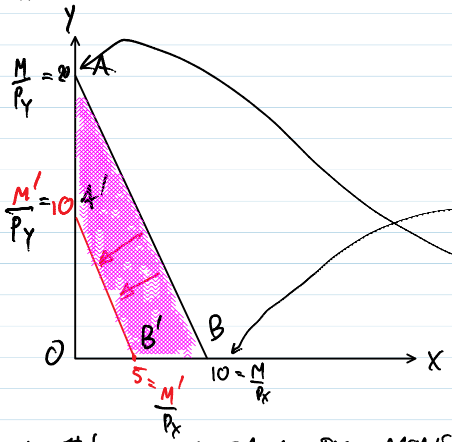
AFFORDABILITY!

$\boxed{\text{DIY}}$ 2 QUESTIONS

(1) WHAT HAPPENS TO THE BUDGET LINE IF P_X FALLS? EXPLAIN W/ ECONOMIC INTUITION.

(2) WHAT HAPPENS TO THE BUDGET LINE IF P_Y RISES?

WHAT HAPPENS TO THE BUDGET LINE IF M FALLS?



B/F	A/F
$M = 1000$	$M' = 500$
$P_X = 100$	$P_X = 100$
$P_Y = 50$	$P_Y = 50$
$\frac{M}{P_X} = 10$	$\frac{M'}{P_X} = \frac{500}{100} = 5$
$\frac{M}{P_Y} = 20$	$\frac{M'}{P_Y} = \frac{500}{50} = 10$

FACT#1 A FALL IN MONEY INCOME CAUSES THE BUDGET LINE TO SHIFT INWARD IN A PARARELL MANNER. (SLOPE REMAINS UNCHANGED)

FACT#2 A FALL IN MONEY INCOME REDUCES HIS BUDGET SET FROM OAB TO OA'B': SOME CHOICES (IN PINK AREA) ARE NO LONGER AVAILABLE.

" A REDUCTION IN MONEY INCOME IS A BAD NEWS TO CONSUMERS "

SO FAR,

I ✓	II ✓	III
PREFERENCES/TASTES (ID)	AFFORDABILITY (BL)	UTILITY MAXIMIZATION (CONTRAINT OPTIMIZATION)

MAIN INTEREST HERE IN THE THIRD ROOM!

$$\boxed{\begin{array}{ll} \text{MAXIMIZE} & U(\overset{=?}{X}, \overset{=?}{Y}) \\ \text{SUBJECT TO} & P_X X + P_Y Y = M \end{array}}$$

$U(X, Y) \longrightarrow$ OBJECTIVE FUNCTION

$P_X X + P_Y Y = M \longrightarrow$ CONSTRAINT

WE CALL THIS BOX " A CONSUMER'S UTILITY MAXIMIZATION PROBLEM "

THE PROBLEM: $\boxed{\begin{array}{l} X^* = ? \\ Y^* = ? \end{array}} \longrightarrow$ MAX U

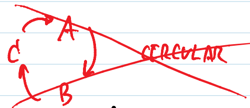
NOW, WE ARE GOING TO OFFER HIM AN ECONOMIC ADVICE TO SOLVE THE PROBLEM ABOVE.

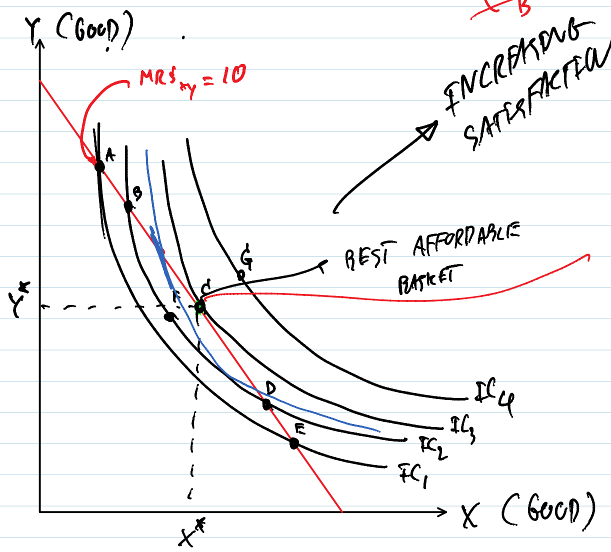
GOLDEN RULE OF UTILITY MAXIMIZATION

CONSIDER A REPRESENTATIVE CONSUMER: MINT.

MINT HAS A WELL-DEFINED GOAL: MAXIMIZE UTILITY GIVEN HER BUDGET CONSTRAINT. MINT'S PREFERENCE IS WELL-BEHAVED:

- SHE IS ABLE TO RANK
- MORE IS BETTER
- SHE LOVES VARIETY
- HER PREFERENCE IS "CONSISTENT" (TRANSITIVITY)
  IF $A \succsim B$ AND $B \succsim C$, THEN $A \succsim C$





FACT #1 AT THE BASKET $C(x^*, y^*)$:

SLOPE OF IC = SLOPE OF BL (TANGENCY CONDITION)

$$MRS_{xy} = \frac{P_x}{P_y}$$

NOTE TH.: AT A OR B: $MRS_{xy} > \frac{P_x}{P_y}$ (i.e., SLOPE OF IC > SLOPE OF BL)

AT D OR E: $MRS_{xy} < \frac{P_x}{P_y}$ (i.e., SLOPE OF IC < SLOPE OF BL)

MRS_{xy} = RATE AT WHICH THE CONSUMER IS WILLING TO GIVE UP ONE GOOD FOR ANOTHER GOOD SO THAT HIS UTILITY REMAINS CONSTANT

EX: $MRS_{xy} = 10 \Rightarrow$ IT IMPLIES THAT HE IS WILLING TO GIVE UP 10 Y FOR 1X

MRS_{xy} CAN BE VIEWED AS "(ADDITIONAL/EXTRA) MARGINAL BENEFIT" OF GOOD X (MEASURED IN TERM OF FORGONE UNITS OF GOOD Y)

$\frac{P_x}{P_y}$ = OPPORTUNITY COST OF GOOD X IN TERM OF GOOD Y.

(EX: $P_x = 100$ (PIZZA) $\Rightarrow \frac{P_x}{\,} = \frac{100}{\,} = 2$

$\overline{P_y}$

(EX: $P_x = 100$ (PIZZA) $\Rightarrow \frac{P_x}{P_y} = \frac{100}{50} = 2$
$P_y = 50$ (PEPSI)

$\frac{P_x}{P_y}$ CAN BE VIEWED AS "MARGINAL COST OF GOOD X (PIZZA)"

SO FAR $MRS_{xy} \rightarrow MB_{x\,(PIZZA)}$

$\frac{P_x}{P_y} \rightarrow MC_{x\,(PIZZA)}$

TAKE A LOOK AT BASKET A: WE OBSERVE THAT

$$MRS_{xy} > \frac{P_x}{P_y}$$

(SLOPE OF IC) (SLOPE OF BL)

SUPPOSE $P_x = 100$, $P_y = 50$, $MRS_{xy} = 10 > \frac{P_x}{P_y} = \frac{100}{50} = 2$

$$\Downarrow \qquad\qquad \Downarrow$$

$$MB_x > MC_x$$

- AT A: PUN IS WILLING TO TRADE 10 PEPSI FOR 1 PIZZA ($MRS = 10$)
  WHEN HE ARRIVES AT THE MARKET, HE FOUND THAT TO GET 1 PIZZA,
  IT REQUIRES ONLY 2 PEPSI. HE MUST BE HAPPY AND THEN
  KEEP BUYING MORE OF PIZZA (GOOD x) AS LONG AS
  $MB_x > MC_x$. HE STOPS BUYING MORE OF
  PIZZA (GOOD x) WHEN HE ARRIVES AT POINT C
  WHERE $MB_x = MC_x$ OR $MRS_{xy} = \frac{P_x}{P_y}$.

DIY: EXPLAIN HOW THE BUYER ADJUSTS HIS BASKET WHEN HE IS FIRST AT BASKET E.

SUMMARY AT AN OPTIMAL BASKET: $MRS_{xy} = \frac{P_x}{P_y}$.
(HERE, BASKET C)

NOW, LET'S TRAVEL BACK TO THE OLD TIME WHEN ECONOMISTS TRY TO STUDY CONSUMER CHOICE BY ASSUMING THAT UTILITY IS MEASURABLE.

NOW, SUPPOSE UTILITY IS MEASURABLE AND THE UNIT OF MEASUREMENT IS "UTILS"

TOTAL UTILITY (TU): TOTAL SATISFACTION FROM A BASKET OF G&S.

MARGINAL UTILITY (MU): ADDITIONAL UTILITY FROM

AN ADDITIONAL UNIT OF G&S

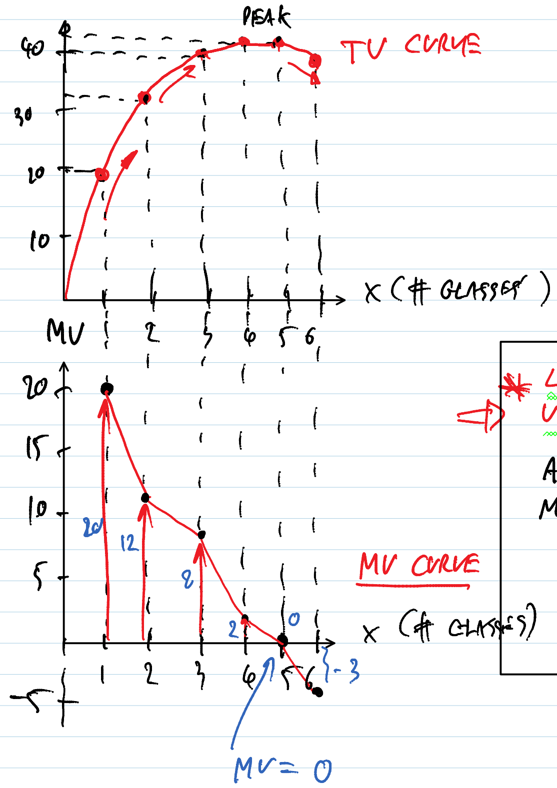
(UTILS)

#GLASS	TU	MU
1	20	20
2	32	12
3	40	8
4	42	2
5	42	0
6	39	-3

CONSIDER A THIRSTY MAN.

OBSERVATION #1 AS HE CONSUMES MORE, TU INCREASES, REACHES ITS PEAK, AND THEN FALLS.

OBSERVATION #2 AS HE CONSUMES MORE, MU IS DIMINISHING. NOTICE THAT MU FROM 3RD GLASS = 8 < MU FROM 2ND GLASS = 12



* LAW OF DIMINISHING MARGINAL UTILITY STATES THAT

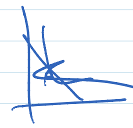
AS A CONSUMER CONSUMES MORE AND MORE UNIT OF A SPECIFIC COMMODITY,

ADDITIONAL UTILITY FROM SUCCESSIVE UNITS GOES ON DIMINISHING!

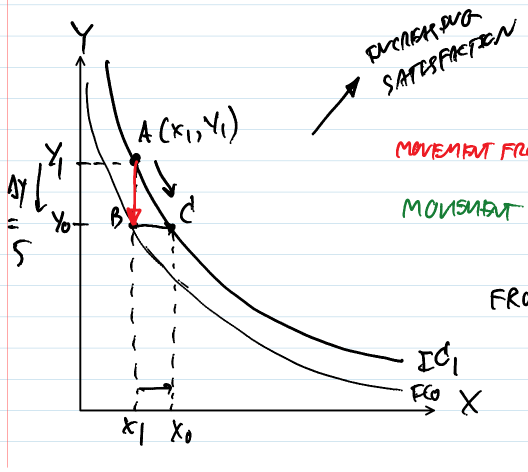
1 IC ✓

2 BL ✓

→ 3 UTILITY MAX ✓



$$\boxed{MRS = \frac{MU_x}{MU_y}}$$



MOVEMENT FROM A → B: UTILITY LOSS = $\underset{(2)}{MU_y} \cdot \underset{(5)}{\Delta Y}$ -10

MOVEMENT B → C: UTILITY GAIN = $\overset{(1)}{MU_x} \cdot \overset{(10)}{\Delta X}$ $+10$

FROM A → C: $\Delta U = 0$

FROM A → C (VIA B): $\boxed{MU_y \cdot \Delta Y + MU_x \cdot \Delta X = 0}$

$$MU_Y \cdot \Delta Y = -MU_X \cdot \Delta X$$

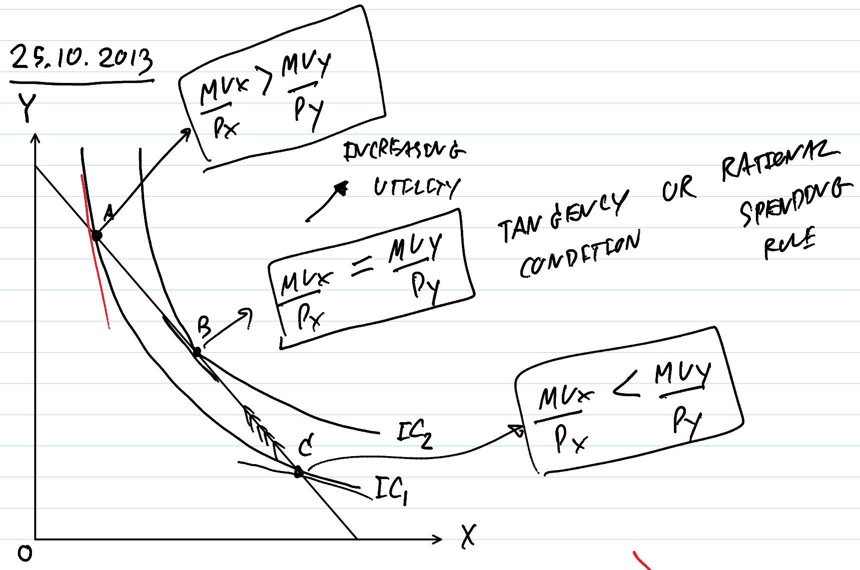
$$MRS_{xy} = \left(\frac{\Delta Y}{\Delta X}\right) = -\frac{MU_X}{MU_Y}$$

ANOTHER EXPRESSION OF MRS:

$$MRS = -\frac{MU_X}{MU_Y}$$

25.10.2013

NOTE: IGNORE THE SIGN AND CONSIDER ONLY MAGNITUDE



CONSIDER BASKET A: SLOPE OF IC $>$ SLOPE OF BL

$$MRS > \frac{P_X}{P_Y}$$

$$\frac{MU_X}{MU_Y} > \frac{P_X}{P_Y}$$

OR $\frac{MU_X}{P_X} > \frac{MU_Y}{P_Y}$

WHERE $\frac{MU_X}{P_X}$ = MARGINAL UTILITY PER BAHT WHEN SPENDING ON X

$\frac{MU_Y}{P_Y}$ = MARGINAL UTILITY PER BAHT WHEN SPENDING ON Y.

X: BEER $\Rightarrow$ MU_X = 100 UTILS $\quad P_X = 50 \Rightarrow \frac{MU_X}{P_X} = \frac{100}{50} = 2$ UTILS/BAHT

Y: WINE $\Rightarrow$ MU_Y = 200 UTILS $\quad P_Y = 400 \Rightarrow \frac{MU_Y}{P_Y} = \frac{200}{400} = 0.5$ UTILS/BAHT

NOTICE THAT $\frac{MU_X}{P_X} > \frac{MU_Y}{P_Y}$.

(BEER) (WINE)

(2) (0.5)

AT BASKET C: SLOPE OF IC $<$ SLOPE OF BL

$$MRS < \frac{P_X}{P_Y}$$

$$\frac{MU_X}{MU_Y} < \frac{P_X}{P_Y}$$

$$\frac{MU_x}{MU_y} < \frac{P_x}{P_y}$$

$$\frac{MU_x}{P_x} < \frac{MU_y}{P_y}$$

TO IMPROVE HIS UTILITY, HE SHOULD BUY MORE OF GOOD Y

AND LESS OF GOOD X (WHY?)

EX:

QUESTION 1: 20 POINTS
TIME TO SPEND TO COMPLETE = 20 MINS } $\frac{MU}{P} = \frac{20}{20} = 1$

QUESTION 2: 30 POINTS
TIME TO SPEND TO COMPLETE = 40 MINS } $\frac{MU}{P} = \frac{30}{40} = 0.75$

FROM THE POWERPOINT SLIDES:

$P_x = 2$, $P_y = 1$, $M = 9$

OPTIMAL BASKET: $(X^* = 2, Y^* = 5) \rightarrow TU = 48$ (MAX)

ONCE MONEY IS USED UP, NOTICE THAT

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

(MARGINAL UTILITY PER BAHT SPENT ON X) (MARGINAL UTILITY PER BAHT SPENT ON Y)

RATIONAL SPENDING RULE (OR GOLDEN RULE OF UTILITY MAXIMIZATION)

A RATIONAL BUYER AIMING AT MAXIMIZING HIS/HER SATISFACTION LEVEL GIVEN LIMITED RESOURCES (MONEY, TIME, ETC), HE/SHE MUST SPEND IN SUCH A WAY THAT ONCE HE/SHE USED UP THE RESOURCES, MARGINAL UTILITY PER BAHT SPENT ON ALL GOODS IS EQUAL:

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

AT (3, 3): TU = 45 UTILS. (LESS THAN $TU^{MAX} = 48$ UTILS)

: $\frac{MU_x}{P_x} < \frac{MU_y}{P_y}$

$\Downarrow$

HE HAS ROOM TO IMPROVE HIS HAPPINESS BY READJUSTING HIS CURRENT BASKET (3, 3)?

BUY MORE OF Y & LESS OF X !

$$(3, 3) \longrightarrow (2, 5)$$

−6 UTILS LOSS

+9 UTILS GAIN

⇒ NET GAIN FROM THIS ADJUSTMENT = −6 + 9 = +3!