Chapter 7
Utility maximization

Apr 29
Wed

* Utility: The amount satisfaction a person gets from consumption of a certain item.

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* Charastistics of utility :-

1. Utility "منفعة" and usefulness "فائدة" are not synonymous. ال "منفعة" Utility الذهب > الماء
لكن ال useful الذهب < الماء ⇐ متزوج نفسك بدون مال

2. Utility is subjective
3. Utility is difficult to quantify "صعب إلها وحدة قياس"

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* Total utility and Marginal utility:

TU: The total amount of satisfaction a person derives from consuming some specific quantities.

MU: The extra utility a consumer gets from additional or extra unit of specific product. "من آخر ساعة / وحدة"

$$MU = \frac{\Delta TU}{\Delta Q} = \frac{TU_2 - TU_1}{Q_2 - Q_1}$$

example →

example:

Q	TU	MU
0	0	— دائماً
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2 → disutility

$$MU = \frac{TU_2 - TU_1}{Q_2 - Q_1}$$

8 ≡ {من التفاحة الثانية أخذت منفعة = 8}

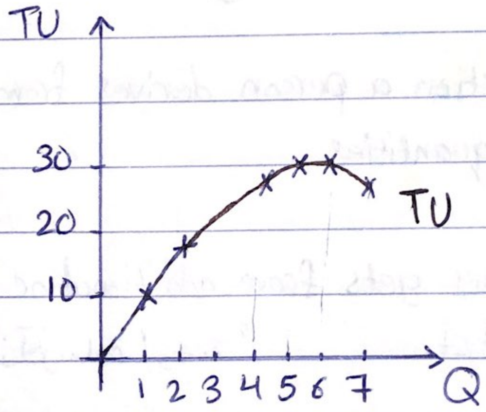
* دائماً TU تكون ⊕ لكن MU : مش شرط
* وكلما زادت Q → MU↓

قانون: ⟵ Diminishing of MU

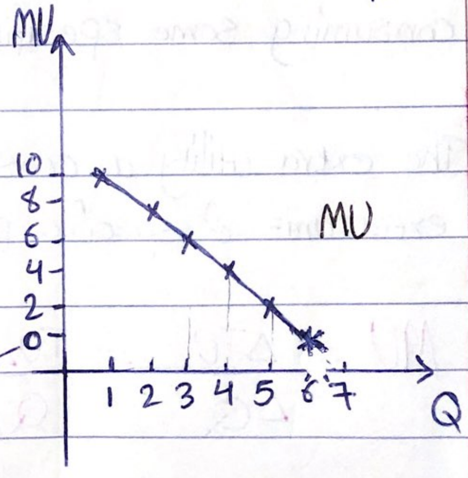
"تناقص المنفعة الحدية".

The marginal utility derived "يتم الحصول عليها" from successive "متتالية" units of a given product will decline.

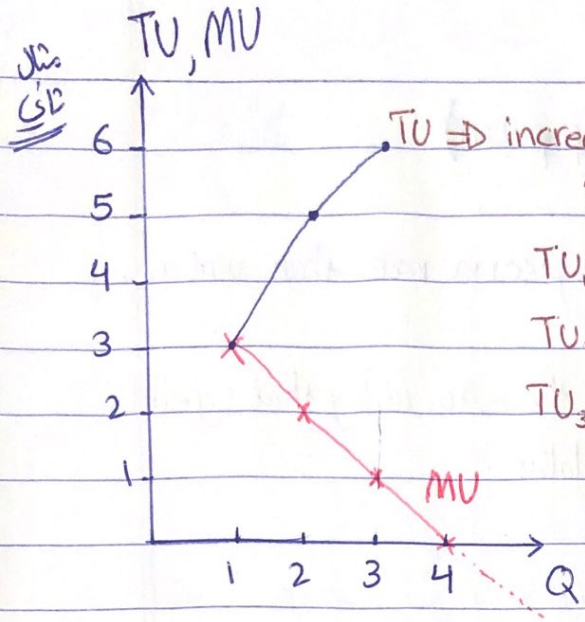
⇒ Q↑ ⇒ MU↓



"ع المثال السابق"



غلط بالرسم بس المهم المبدأ ←



مثال توضيحي

TU ⇒ increasing with decreasing rate
" يزيد بس بنسبة أقل من اللي قبل "

$TU_1 = 3$
$TU_2 = 5$
$TU_3 = 6$

* الزيادة بتقل ⇒ لما نزيد عدد الوحدات TU دال

* بتوصل (MU = 0) max.
بعدين بتقل (MU = ⊖)

* MU = 0 ⇒ ∴ TU = maximum
* MU : max. ⇒ TU : min.

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* Utility maximizing rule:

⇒ To maximize satisfaction, the consumer should allocate his money so that the last dollar spent on each product yeild the same amount of marginal utility.

ex: Ahmad purchases two products; mineral water and popcorn, MU (mineral water) is 70 and MU (popcorn) is 60. The price of a bottle of mineral water is $2 and the price of a box of popcorn is $1.15. How should Ahmad buy?

sol: $\frac{MU}{P}$ ⇒ $\frac{70}{2} = 35$, $\frac{60}{1.15} = 52.17$

→

$\Rightarrow \frac{MU}{P}$ (water) $<$ $\frac{MU}{P}$ (popcorn)

$\Rightarrow$ Ahmad should buy popcorn more than water.

→ Marginal utility per dollar: the extra utility that yeilds from spending the last dollar.

※ $\Rightarrow$ Utility maximization rule:

1. $\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$ 2. $I = P_x X + P_y Y$.

"to maximize ---- ⇐ "حصول التطابق"

<u>example</u>: Mohammad has \$24 to spend each day, the only two goods he is interesting in purchasing are apple and orange. MU for the two goods are shown below, price (Apple) = \$4 and price (orange) = \$2

Apple			Orange		
Q	MU	MU/P	Q	MU	MU/P
1	48	12	1	24	12
2	32	8	2	15	7.5
3	24	6	3	12	6
4	16	4	4	8	4
5	8	2	5	6	3
6	4	1	6	4	2

المطلوب: كم لازم يشتري تفاح؟ وكم برتقال؟

$\Rightarrow$ What quantity of each good will Mohammad purchases to maximize utility?

→

-- Rule (قوي) : المرجع

MU/$	Apple	orange	
12	1	1	6
6	3	3	18
4	4	4	24
2	5	6	32

32 ما بزبط
$24 = Income عنا ال

May 11, 20

⇒ 4 apples + 4 oranges.

* How much the total utility that Ahmad gets from consuming these quantities

TU = 48 + 32 + 24 + 16 + 24 + 15 + 12 + 18 = 179 units.
↳ Max. utility.

* Suppose that the price of apple has increased from 4 to 8, while the price of orange and income remain unchanged. How much apple and orange will consume at this new price.

	MU/P
1	6
2	4
3	3
4	2
5	1
6	0.5

نفس MU/P ال orange

⇒ 2 apples & 4 oranges.
(2×8) + (4×2)
= 16 + 8 = $24

⟶

Apple				Orange		
Q	MU	MU/P		Q	MU	MU/P
1	48	6		1	24	12
2	32	4		2	15	7.5
3	24	3		3	12	6
4	16	2		4	8	4
5	8	1		5	6	3
6	4	0.5		6	4	2

Price (Apple) = $8

MU/P	Q	Price (Total)
6	1, 3	$14
4	2, 4	24
3	3, 5	34
2	4, 6	44

⇒ Best choice: 2 Apples + 4 Oranges.
(according to the income) → $24

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* Water diamond paradox.

→ Water & diamond: Water has great supply relative to demand → السبلاي عالي

But: Diamonds are rare (نادر), supply is small relative to demand → السبلاي قليل

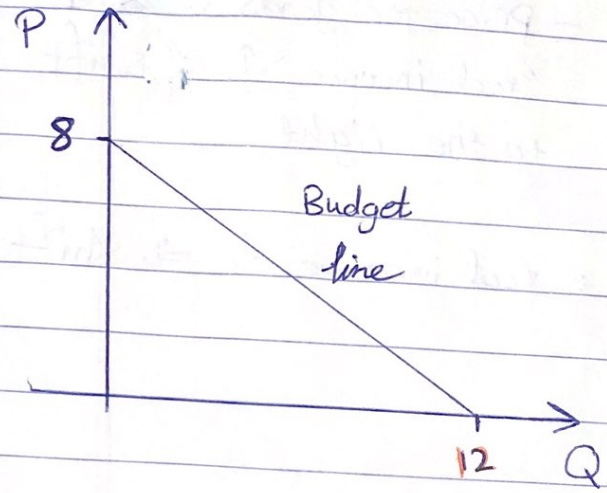
* Water ⇒ MU: last unit of water is very low (MU↓)

Diamonds ⇒ MU: last unit of diamond is high (MU↑)

MU خلال من بنحددها إحنا لهذا Supply & demand ←

"خط الميزانية"

* **Budget line** : Schedual or curve showing various combination of two products a consumer can purchase with specific money income.



* $P_A = \$1.5 \Rightarrow \frac{12}{1.5} = 8$ (الوحدة)

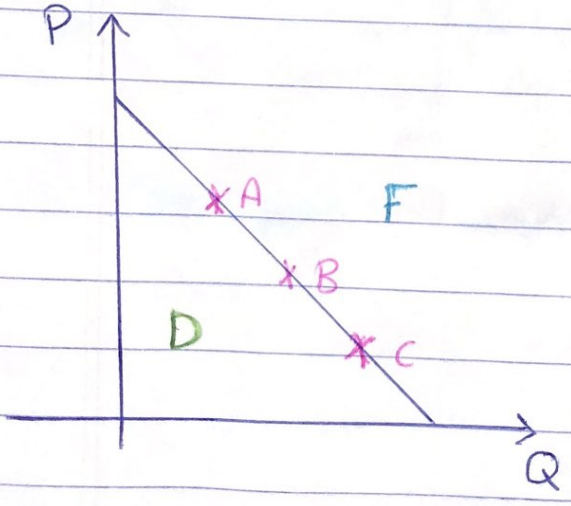
إذا بدي أشتري بكل دخلي من سلعة A .

* $P_B = \$1 \rightarrow \frac{12}{1}$

$= \$12$

If you buy 3B : $3(1) + Q_A(1.5) = 12$

$(1.5) * Q_A = 9 \Rightarrow \boxed{Q_A = 6}$



A, B, C : Attainable

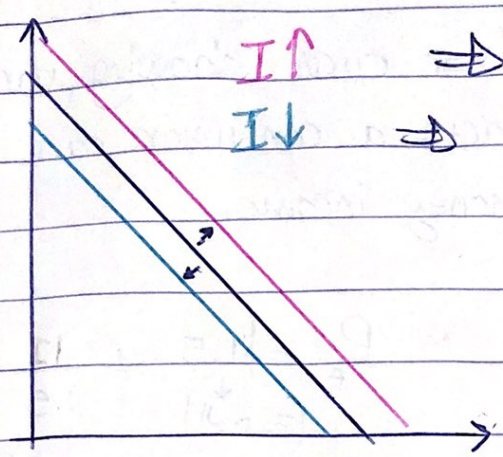
"consumer spend all income"

D: Attainable

"consumer doesn't spend all income".

F: Unattainable "غير متاح"

ماقي معاي كافية



I↑ ⇒ shift to the right

I↓ ⇒ shift to the left

- Price for goods ↓ ∴ I↑ "real income" ↑ ⇒ shift to the right.

- Price for goods ↑ ∴ real income ↓ ⇒ shift to the left.