2, 4, 6

What is microeconomics?

⇒ allocation of scarce resources
↳ demand (Goods to ppl)
↳ Supply (inputs to outputs)

Consumption bundles + Budget constraints

- Consumption choice set constrained by budget, time, resources

x_1 = coffee (x_1, x_2) ⇒ consumption bundles
x_2 = OJ (1,1) ? (3,5) (how much of each good)
(10,2)

↳ need to incorporate price! What bundles can we afford?

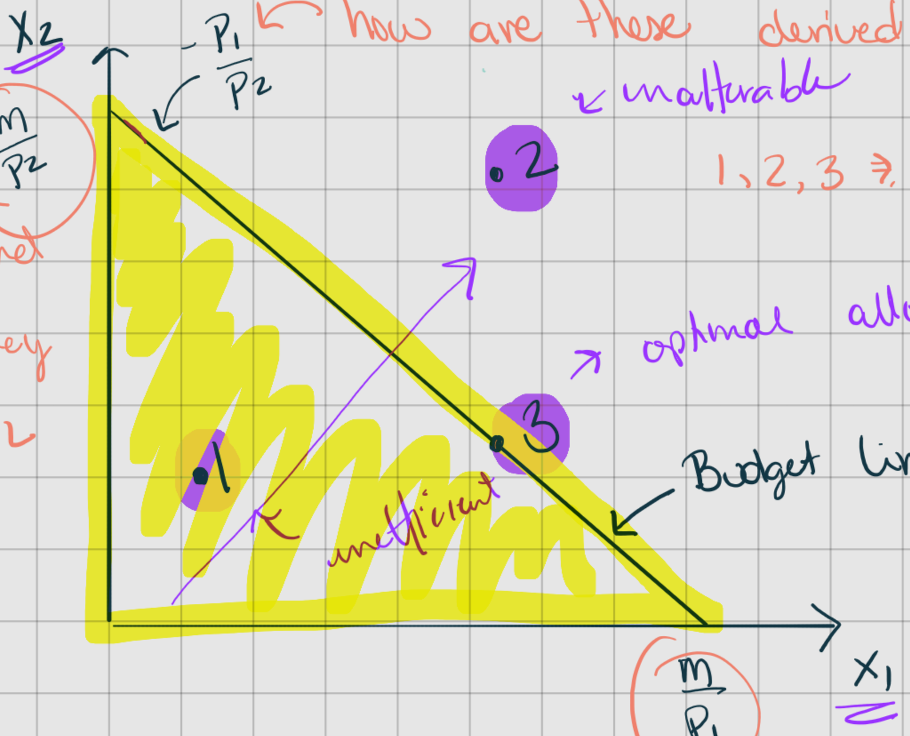
→ $p_1 x_1 + p_2 x_2 \le m$ ← total $

what does this represent (?)

Prices Total exp. income

out $\le m$
out $> m$

how are these derived (?)



if we spend all money on x_2

1, 2, 3 ⇒ what do these represent?

$m = x_1 p_1 + \cancel{p_2 x_2}$

$m = x_1 p_1$

if we spend all $ on x_1

$m = p_1 x_1 + p_2 x_2$ ← slope

$$\left[\, x_2 = \frac{m}{p_2} - \frac{p_1 x_1}{p_2} \,\right]$$

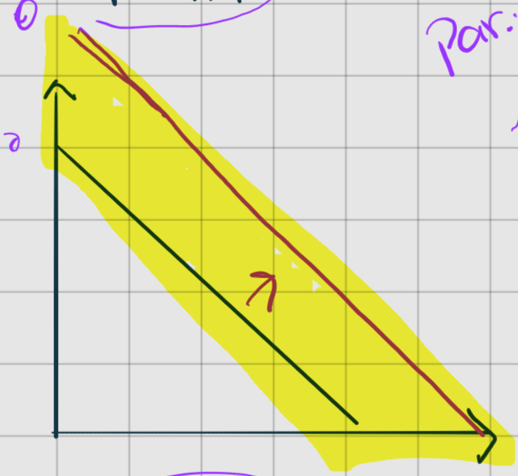
$m = x_1 P_1 + x_2 P_2$

Changes in income & Price (what happens)

↑ m

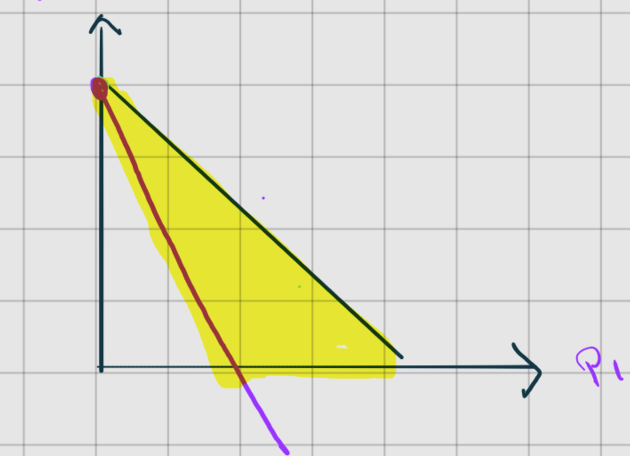
Par.: shift in BL

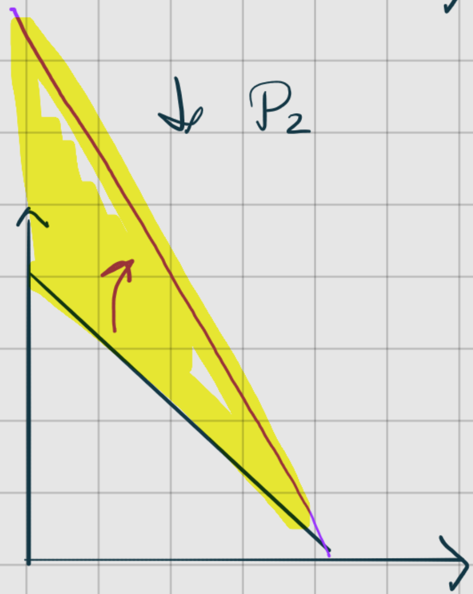
↓ m



↑ P_1

↓ P_2





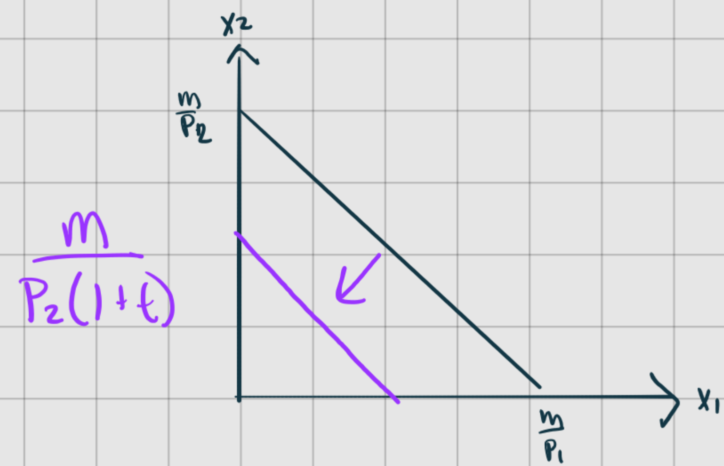
↳ taxes are special case of price change

5%

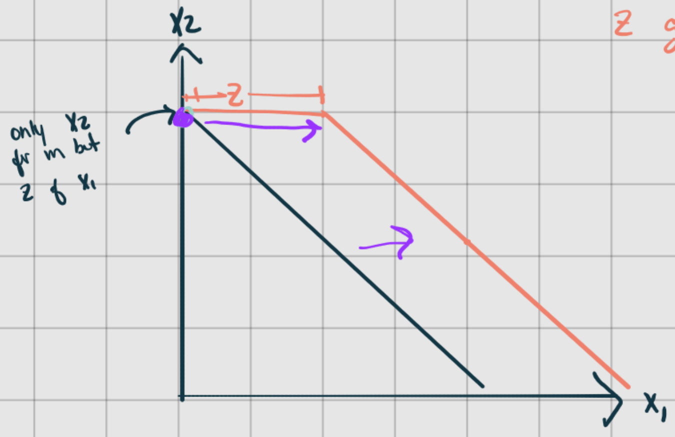
\$1 → \$1.05

$$(1+t)p_1 x_1 + (1+t)P_2 x_2 = m$$

* ↑ in Price! *



↳ Gifts → shift budget set (afford more!)

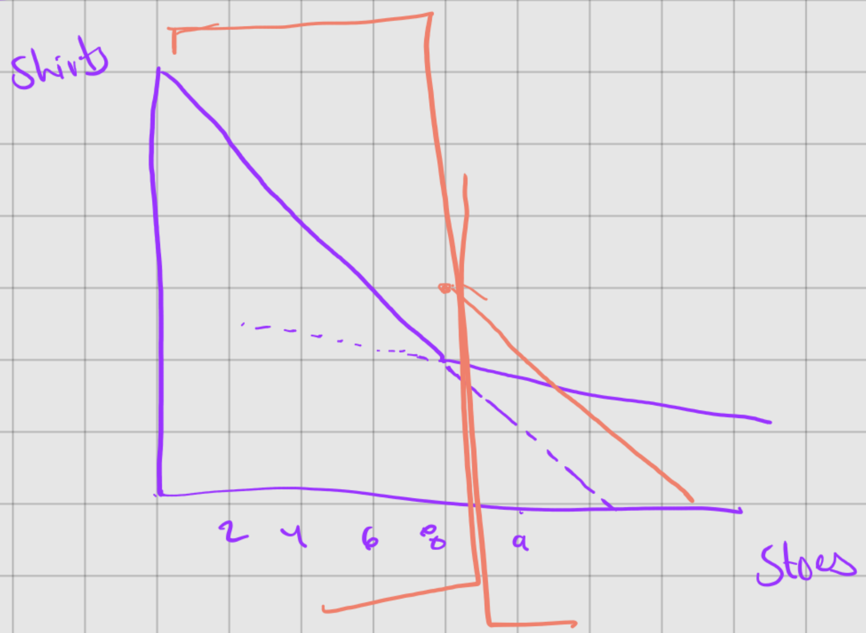


z gift of x_1

t-shirts

Shoes ⇒ 2 pairs

Discounts & Bulk



Preferences : how ppl make decisions (utility)

Relations ⇒
$x \succ y$ ⇒ x strictly better
$x \succsim y$ ⇒ at least as good as X
$x \sim y$ ⇒ x + y indiffer

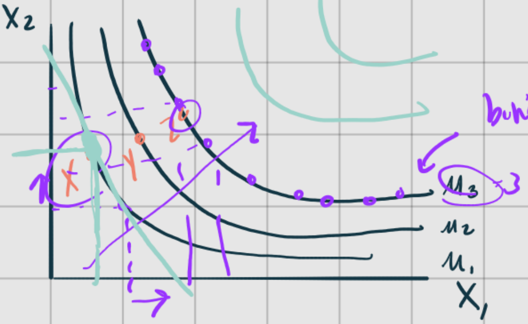
↳ Assumptions: ① Completeness ⇒ relations for goods ∴ can be compared!
② transitivity (consistent) ⇒ $x \succsim y$, $y \succsim z$ ≻ $x \succsim z$
more = better
③ Monotonic ⇒ more is better
④ Convexity ⇒ downward

apples > org., org > ban ⇒ app > ban.
ban > apples

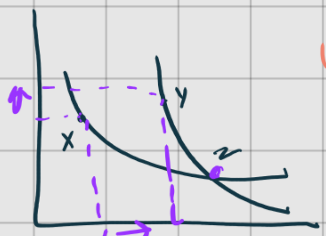
if the than Rational + can solve via constrained op.

⇒ how do these assumptions relate to indifference curves?

IDC = bundles where indifferent ← meaning?



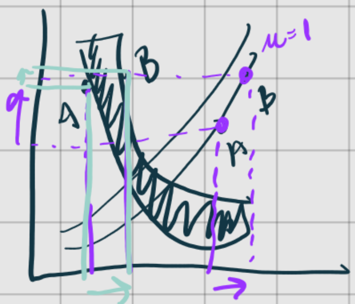
bundles that we get the same utility



$x \sim z$ ⇏ $x \sim y$
$y \sim z$ $y > x$

→ do not have transitivity

what's wrong.



not mon

$u = x_1 + x_2$

Utility: Show preference relations (show same info as IDC)

$u = x^\alpha y^{z^2} + y^2$

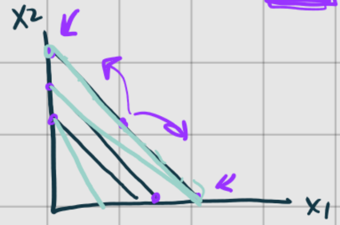
$3 = x^0 + x_2$

$\frac{\partial u}{\partial x_1} = \alpha$

↳ types: (1) **Perfect subs** $u(x_1, x_2) = \alpha x_1 + \beta x_2$

$X \sim y$

coke ~ pepsi



$MU_{x_1} = \alpha$

$MU_{x_2} = \beta$

(2) **Perfect Comp.** $u(x_1 x_2) = \min(\alpha x_1, \beta x_2)$

MU_1 vs MU_2

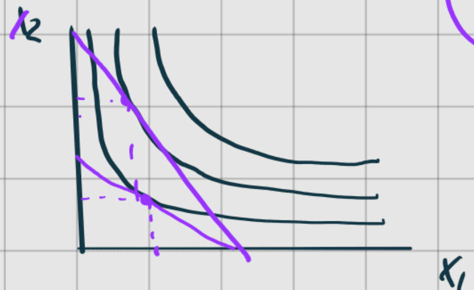
proportions

slices → $\frac{10}{1}$ 2-1

$3 = \min(x_1, x_2)$ 3 4

$\frac{\partial U(x_1, x_2)}{\partial x_1} = \alpha x_1^{\alpha-1} x_2^{\beta}$

(3) **Cobb-Douglas** $u(x_1 x_2) = x_1^{\alpha} x_2^{\beta}$



$MU_{x_1} = \alpha x_1^{\alpha-1} x_2^{\beta}$

$MU_{x_2} = x_1^{\alpha} \beta x_2^{\beta-1}$

$\frac{\alpha x_1^{\alpha-1} x_2^{\beta}}{\beta x_1^{\alpha} x_2^{\beta-1}}$

$MRS_{1,2} = \frac{MU_1}{MU_2}$ $\frac{\alpha}{\beta} \frac{x_2}{x_1}$

Marginal Utility: Incremental change (1 more unit x_1 = Δu)

$MU = \frac{\partial u}{\partial x}$

how much U do I gain from 1 more unit of X

Δ
1 - 2
2 - 3
3 - 4

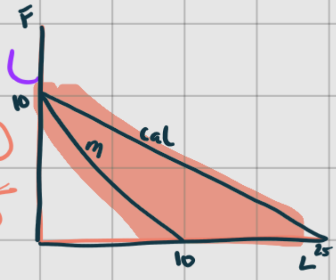
Marginal Rate of Sub: $MRS = \frac{\partial MU}{\partial MU} = -\frac{MU_{x_1}}{MU_{x_2}}$

how much of x_2 am I willing to give up for more of x_1

Q2:

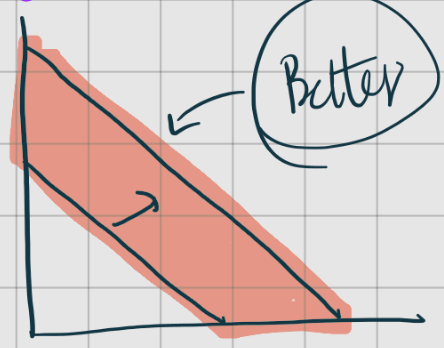
1)

	m	P_F	P_L		Q_F	Q_L
C:	$400	40	10	→	10	40
	100	10	2.5	→	10	25
Mis:	$100	10	10	→	10	10



2) $200 → (↑50% performance)

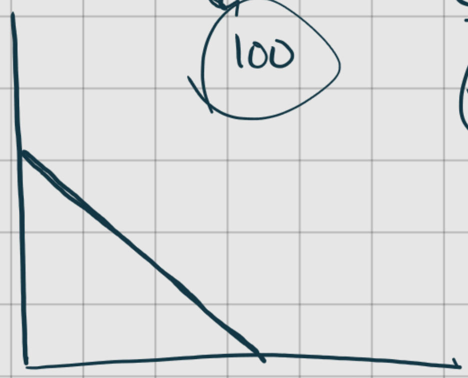
$300



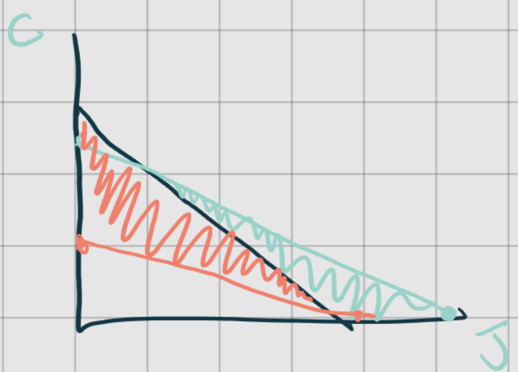
3) $200 ↑50%

$300 $2 → $3

100 100



4) Jap ↓ Ch. ↑ $\bar{m}$



B

W

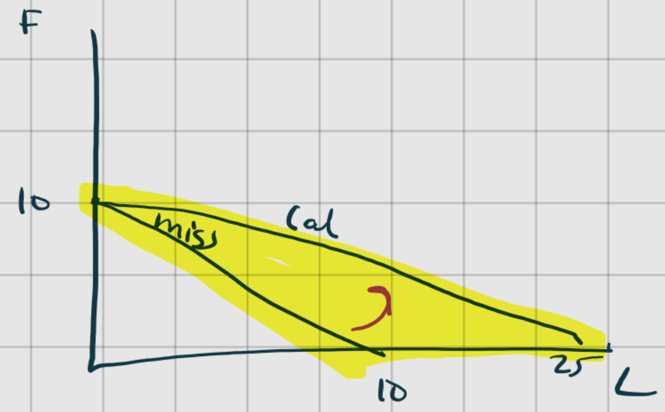
S

IDK

Q2 :

1) F & L

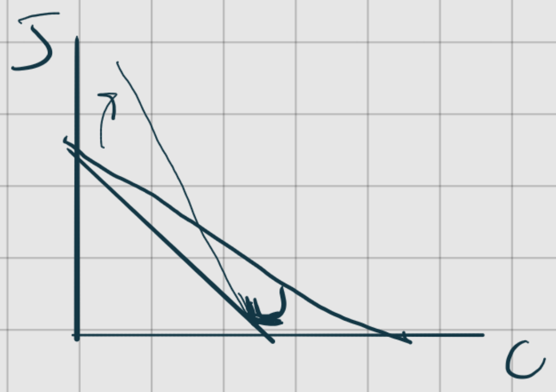
	m	Pf	PL		QF	QL
California	\$400	\$40	\$10	⇒	10	40
	\$100	10	2.5	⇒	10	25
Miss.	\$100	\$10	\$10	⇒	10	10



2) \$200/day ⇒ 50% ↑ in income ⇒ Better !
Based on Performance

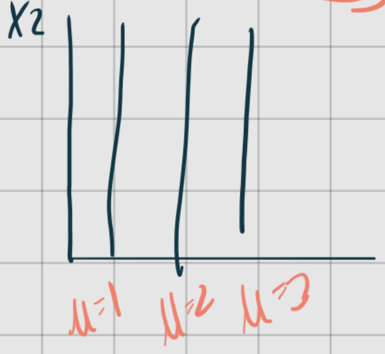
3) \$200/day ⇒ 50% ↑ b/c 50% inflation ⇒ Same

4) Jap ↓P + Chin ↑P ≻ depends on change in Both



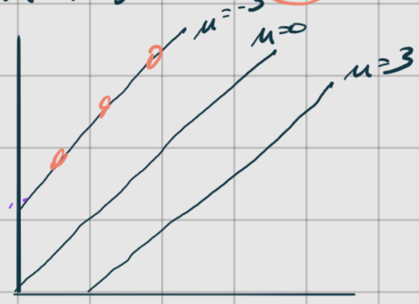
Q4: draw pre

$u(x_1, x_2) = x_1$



$u(x_1 x_2) = x_1 - x_2$

x_2 = bad!



$\bar{u} = x_1 - x_2$

-3, 0, 3

$x_2 = x_1 - \bar{u}$

$3 = 5 - 2$

$0 = 5 - 5$

$1 - 1$

Q6: $u(x, y) = \frac{1}{2} x^a y^b$

$\partial u / \partial x$

$\partial u / \partial y$

Sign of derivative
if we add one more unit is the Δ in u
(+)

ΔMU

1) $MU_x = \frac{1}{2} a x^{a-1} y^b > 0$ ∴ more is better

$MU_y = \frac{1}{2} x^a b y^{b-1} > 0$ & monotonicity satisfied

2) MU of X diminish, constant or increased as they consume more X

$$\frac{\partial^2 u}{\partial x^2} \rightarrow \frac{\partial MU_x}{\partial x} = \frac{1}{2} a(a-1) x^{a-2} y^b < 0$$

0-1

∴ diminishing returns as X↑
u↑ but the Δ in U↑ for each unit is less & less

More X increase utility but less & less

a-1-a

3) $$MRS_{xy} = \frac{MU_x}{MU_y} = -\frac{\frac{1}{2} a x^{a-1} y^b}{\frac{1}{2} x^a b y^{b-1}} = \boxed{-\frac{a}{b} \frac{y}{x}}$$

4) $\boxed{a, b = \frac{1}{4}}$ → $MRS(3, 12) = -\frac{\frac{1}{4}}{\frac{1}{4}} \frac{12}{3} = -4$ ← give 4 units of y for 1 unit of X (have little x)

$MRS(12, 3) = -\frac{\frac{1}{4}}{\frac{1}{4}} \frac{3}{12} = -\frac{1}{4}$ ← give 0.25 units of y for 1 unit of X (have lots of x already)

amount of y willing to give up for more X

5/6) $a, b = \frac{1}{3}$ $u = 2$ & $u = 3$ $mrs(4,16)$ $mrs(16,4)$