Demand:

1, 3, 5

· Demand function - indicates optimal choice for a given set of P's + m
$\left[x^*(P_1, P_2, m) \right]$ - also from preferences

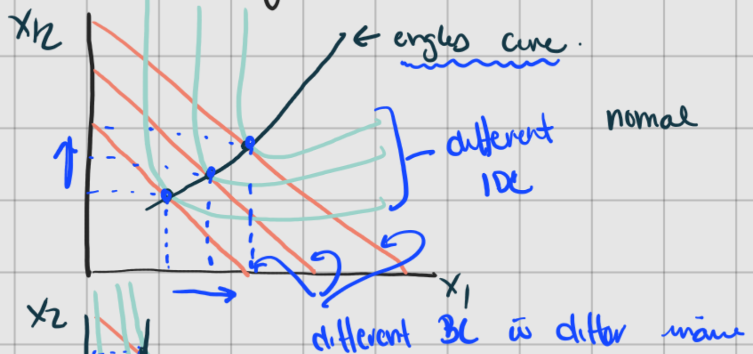
↳ how does indival demand change: $\left[x_1^* = \left(\frac{a}{a+b}\frac{m}{P_1}\right) P_2 \right]$

(1) ↑ in m:

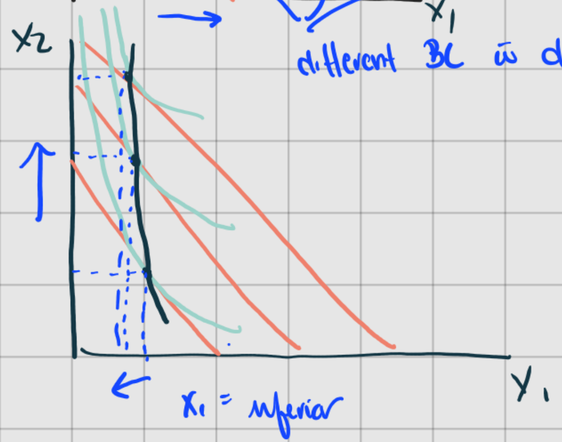
$\left[\frac{\partial x_1^*}{\partial m} \begin{array}{l} \boxed{>0} \\ <0 \end{array} \right.$ normal Good (↑ consumption as ↑ m) ← · Vaccations · Meat consump.
inferior Good (↓ consumption as ↑ m) ← store brand

how does consumption of x_1 change w/ m

* engles curve: maps level of income to optimal x_1^* + x_2^*



normal



inferior

$x_1^* = \frac{a}{a+b}\frac{m}{P_1}P_2$

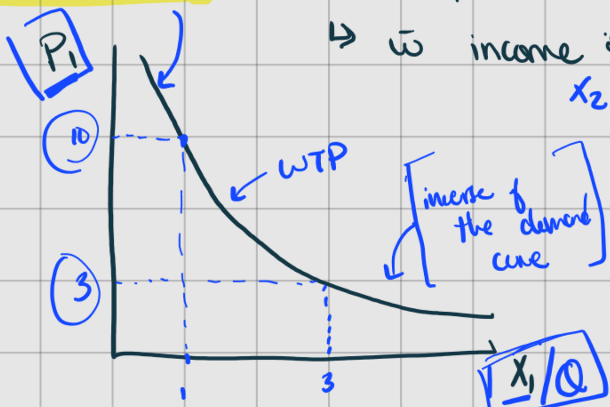
(2) ↑ in P_1:

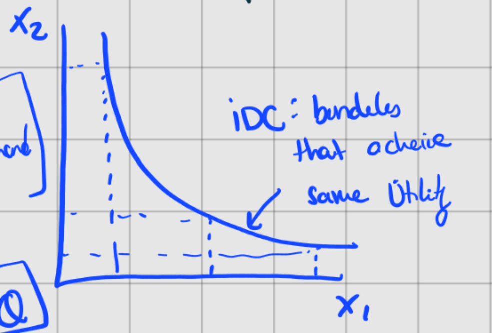
$\left[\frac{\partial x_1^*}{\partial P_1} \begin{array}{l} <0 \\ >0 \end{array} \right]$ → ordinary Good (↓ consumption as ↑ P_1) ← gas?
giffen Good (↑ comption as ↑ P_1) ← collectable

how does consumption of x_1 Δ w/ P_1

* demand curve: relationship b/w Prices + quantity *
↳ w/ income & other Prices constant *

*P_2, M, are constant *





(3) ↑ in P_2 : $\left[x_1^* = \frac{a}{a+b} \frac{m}{P_1} P_2 \right]$

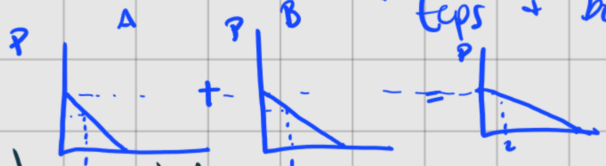
OJ for apple juice

$\frac{\partial x_1^*}{\partial P_2}$ > 0 Gross substitutes (↑ consumption of P_2 ↑)

< 0 Gross compliments (↓ consumption of P_2 ↑)

tops + bottoms

how does consumption of x_1^a Δ as the price of x_2 Δ's



· Market Demand = horizontal summation of individual demand

for each price how much x is consumed

ie $\left[\begin{array}{c} 100 \text{ individuals} \\ x_1^* = \frac{a}{a+b} \frac{m}{P_1} \end{array} \right]$ $\succ$ $X = 100 \cdot x_1^*$

market

$100 \left(\frac{a}{a+b} \frac{m}{P_1} \right)$

individual

ie: a : $x = 20 - p$

b : $x = 30 - 3p$

$x = 0$ $p = ?$

$0 = 20 - p$

$p = 20$

$p = 0$ $x = ?$

$x = 20 - 0$

$x = 20$

$x = 0$ $p = ?$

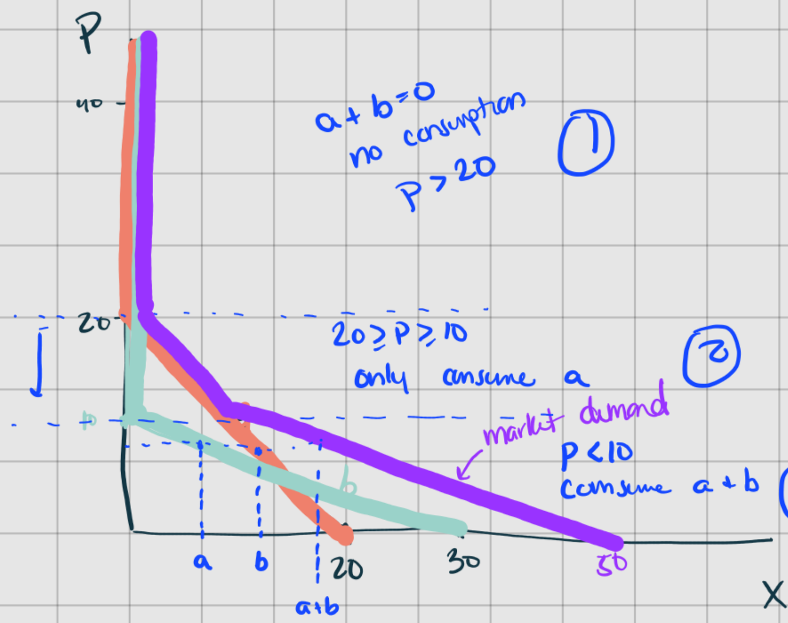
$0 = 30 - 3p$

$p = 10$

$p = 0$ $x = ?$

$x = 30 - 3(0)$

$x = 30$



$$\left[X = x_a + x_b = \begin{cases} 0 & \text{if } P > 20 \\ 20 - p & \text{if } 10 \leq P \leq 20 \\ 50 - 4p & \text{if } P < 10 \end{cases} \right]$$

$a + b = 20 - P + 30 - 3p$

$= 50 - 4p$

↳ General case

$i = 1, 2, 3, 4$

consumers : $i \in \{1, 2, \dots N\}$

demand : $x^i(P_1, P_2, m^i) \leftarrow x^i(\underline{P_1, P_2}\ m^i)$ ← same person

↑ individual ppl are price takers

Market demand $= X = \sum_{i=1}^{i=N} \underline{x^i(P_1, P_2, m^i)}$

$i=N$ ← total # of consumers

$i=1$ ↑ starting @ 1

$$X = \sum_{i=1}^{i=2} x^i(P_1\ P_2\ m^i) + \sum_{i=3}^{i=2} x^i(P_1\ P_2\ m^i)$$

WTP ← discrete goods + Reservation Price

$U(\text{Toyota},\ \underline{m - P_T})$

↑ either 1/0 ↑ \$

$U = (\text{car}, \$)$

$(\text{car}, m - P) \quad (\text{No}, m)$

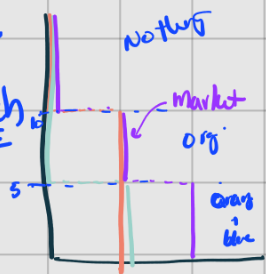
compare the utility gain from having to the price of a car

$\Rightarrow$ if $T = 1$: $U = (1, m - P_T)$

$T = 0$: $U = (0, m)$

↳ if $\boxed{\frac{\partial U}{\partial T}} \geq 0$ $\therefore$ $U(1, m) > U(0, m)$ ← having

for high enough $\underline{P_T}$ ← Price too much



$U(1, m - P_T) < U(0, m)$

↑

Reservation Price

↑

WTP anything below the RP

* if Price below *

then Purchase of not, than do not

· Elasticity - measure of responsiveness of demand to price

(responsiveness → rate of change)

own
cross
income

$$|\varepsilon| = \frac{P}{X}\frac{\partial x}{\partial p} \quad \text{aka} \quad \frac{\Delta X / X}{\Delta P / P}$$

$\frac{\partial x}{\partial p}$ ← derivative of x wrt p

$\frac{\Delta X}{\Delta P}$ = derivative

rate of Δ of X

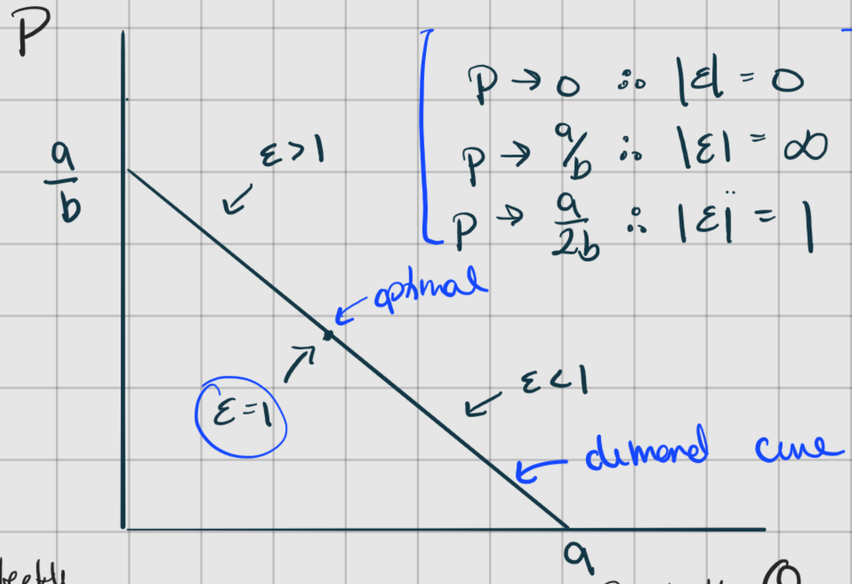
rate of Δ of P

$|\varepsilon| > 1$ elastic demand (demand Δ w/ P)

< 1 Inelastic demand (demand ~~Δ~~ w/ P)

ex: $q = a - bp$ ← demand function

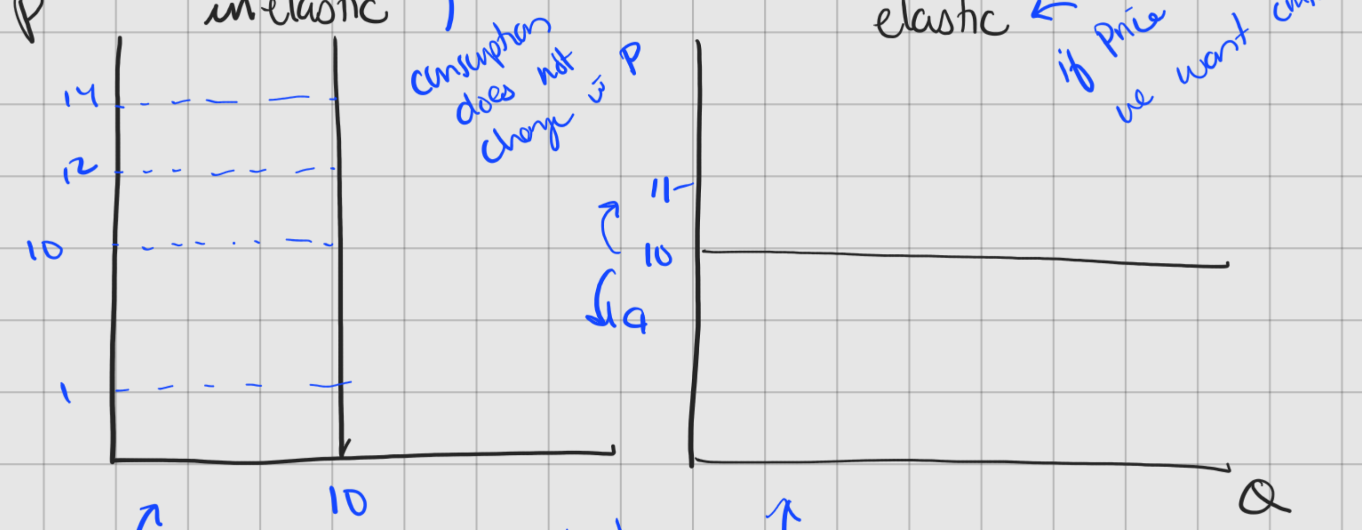
$$\boxed{\varepsilon = \frac{P}{q}\frac{\partial q}{\partial p}} = \frac{P}{\boxed{a-bP}}(-b) = \boxed{\frac{-Pb}{1-bP}}$$



$p \to 0 \therefore |\varepsilon| = 0$

$p \to a/b \therefore |\varepsilon| = \infty$

$p \to \frac{a}{2b} \therefore |\varepsilon| = 1$



medication
water, rent, electricity

Concert ticket
clothes

(Q1) 90 consumers

$60 = A \Rightarrow u(x,y) = x^{1/3} y^{1/3}$ m_a

$30 = B \Rightarrow u(x,y) = x^{2/3} y^{1/3}$ m_b

) CD

$X = \frac{\frac{1}{3}}{\frac{1}{3}+\frac{1}{3}} \frac{m_a}{P_x}$ $\quad Y = \frac{1}{2}\frac{m}{P_y}$

(#1) demand for A

$$X_a = \frac{a}{a+b}\frac{m}{P} = \frac{1}{2}\frac{m_a}{P_x} \qquad Y_a = \frac{1}{2}\frac{m_a}{P_y}$$

individual Demand

(#2) demand for B

$$X_b = \frac{a}{a+b}\frac{m}{P} = \frac{2}{3}\frac{m_b}{P_x} \qquad Y_b = \frac{1}{3}\frac{m_b}{P_y}$$

$$X = \frac{\frac{2}{3}}{\frac{1}{3}+\frac{2}{3}}\frac{m}{P_x} \qquad Y = \frac{1/3}{\frac{2}{3}+1/3}\frac{m}{P_y}$$

(#3) market demand of X

# of ppl in B

$$X = \left(\frac{1}{2}\frac{m_a}{P_x}\right)60 + \left(\frac{2}{3}\frac{m_b}{P_x}\right)30 = 30\frac{m_a}{P_x} + 20\frac{m_b}{P_x}$$

X

# of ppl in A

(#4) market demand of Y

$$Y = \left(\frac{1}{2}\frac{m_a}{P_y}\right)60 + \left(\frac{1}{3}\frac{m_b}{P_y}\right)30 = 30\frac{m_a}{P_y} + 10\frac{m_b}{P_y}$$

(#5) if $P_x = 2$, $P_y = 2$, $m_a = 60$, $m_b = 120$

$$X = 30\left(\frac{60}{2}\right) + 20\left(\frac{120}{2}\right) = 2100$$

$$Y = 30\left(\frac{60}{2}\right) + 10\left(\frac{120}{2}\right) = 1500$$

(Q3) 200 individuals

$\frac{\partial x}{\partial P_x} = -\frac{1m}{3}\left(\frac{1}{P_x^2}\right) \Rightarrow (-) < 0$ ∴ Ordinary Good

less consumption ↑ P_x

(#1) all have same demand $\left[u = x^{1/3} y^{2/3}\right]$ of Market demand of X

$\left[x = \frac{1}{3}\frac{m}{P_x}\right]$ individual

$X = 200\left(\frac{1}{3}\frac{m}{P_x}\right) \Rightarrow \frac{200}{3}\frac{m}{P_x}$ market / total

(#2) own Price elasticity of demand of X, constant or changing?

how does ↑ of consump of X change as P_x ↑

$\varepsilon = \left[\frac{P}{\cancel{Q}}\right] \cdot \left[\frac{\partial \cancel{Q}}{\partial p}\right] = \frac{\cancel{P_x}}{\frac{\cancel{200}\,\cancel{m}}{\cancel{3}\,\cancel{P_x}}} \cdot \left(\frac{\cancel{200}}{\cancel{3}}\right)(-1)\left(\frac{\cancel{m}}{\cancel{P_x^2}}\right) = -1$

$\boxed{|\varepsilon| = 1}$

$-\frac{P_x\left(\frac{\cancel{200}}{\cancel{3}}\right)\cancel{m}}{\frac{\cancel{200}\,\cancel{m}}{\cancel{3}\,P_x}\,P_x^2}$

$-\frac{\cancel{P_x}^2}{\cancel{P_x}^2} = -1$

(#3) $m = 150$

$P_x = 4$

$P_y = 3$

$X = 2500$

(#4)

(Q5) Adam : $X_a = \max\{0, 20-2p\}$ ← not perfect compliments

Barbara : $X_b = \max\{0, 30-2p\}$

Find market demand & ε @ $\boxed{P=40}$

$P=40 \therefore X_a = \max\{0, 20-2(40)\}$

$= \max\{0, -60\}$

$\boxed{=0}$

$X_a^* = 0$

$X_b = \max\{0, 30-2(40)\}$

$= \max\{0, -50\}$

$\boxed{=0}$

$X_b^* = 0$

$+ = 0$

$\Rightarrow \therefore$ Market demand is 0

$\varepsilon = 0$ (perfectly inelastic)