Price elasticity, $e_p = \frac{p}{q} \times \frac{\Delta q}{\Delta p}$

$e_p = \infty$ = perfectly elastic demand
$e_p = 0$ = perfectly inelastic
$e_p = 1$ - unit elastic
$1 < e_p < \infty$ => elastic demand
$0 < e_p < 1$ => inelastic demand

p - initial price
p_1 - change price
q - initial quantity
q_1 - changed quantity

a) Calculate the price elasticity of demand if demand increases from 4 units to 5 unit due to fall in price from Rs 10 to Rs 8

$p = 10$ $p_1 = 8$

$q = 4$ $q_1 = 5$

$\frac{5}{4} = 1.25$

$e_p = \frac{10}{4} \times \frac{1}{-2} = -1.25$

= can be ignored

$= 1.25$

$1 < e_p < \infty$ so it is elastic demand

a) A mobile manufacturing company sells its mobile phones at a price of Rs. 4500 per unit and in a year the company sells 10000 handsets when they decrease the price to rupees 4000 sales increased to 12000 units what is price elasticity of demand how this mobile phone

ans $P_2 = 4500$ $P_1 = 4000$

$q_2 = 10000$ $q_1 = 12000$

$$e_p = \frac{P}{q} \times \frac{\Delta q}{\Delta P}$$

$$= \frac{4500}{10000} \times \frac{2000}{-500} \times -1 = \frac{12000}{10000} \times \frac{12}{10} = 1.8$$

$$\text{saved} \quad \frac{18000}{10000} = 1.8$$

$=$

$= 1.8$

elastic demand

e) In above question if this company wants to increase its sale by 50% to what percentage this price is to be reduced

ans $$e_p = \frac{\% \text{ change in demand}}{\% \text{ change in price}}$$

$$1.8 = \frac{50}{\% \text{ change in price}}$$

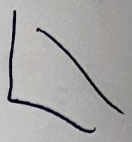
$$\% \text{ change in price} = \frac{50}{1.8}$$

$$= 27.78$$

e.

18 | 500 | 28 | 140

Q) The demand fn of a commodity is given as $D = 10 - 2p$ what is the elasticity of demand of the product when price of product is 4 Rs



ans :- $D = 10 - 2p$

$y = mx + c$

slope $m = -2$ $\quad \frac{\Delta q}{\Delta p} = m$

$p = 4$

$D = 10 - 2 \times 4 = \underline{2}$

$epc = \frac{p}{q} \times \frac{\Delta q}{\Delta p}$ $\quad$ q - quantity / demand

$= \frac{4}{2} \times -2 = \underline{-4}$ 4

Q) A consumer spends 40 on a good at a price of 1/unit and 60 at a price of 2/unit. what is the price elasticity of demand. what kind of good it is what shape its demand curve will take

ans

$P = 1$ $\quad P_1 = 2$

$q = 40$ $\quad q_1 = 60$ 30

$ep = \frac{1}{40} \times \frac{-10}{1} = \frac{-1}{4} =$ ~~0.25~~ 0.25

Consumer surplus

Producer surplus

dead weight loss

e_p = % change in qty demanded / % change in price

$$= \frac{\frac{q_1 - q}{q}}{\frac{p_1 - p}{p}} = \frac{q_1 - q}{p_1 - p} \times \frac{p}{q}$$

$$e = p \quad \frac{p}{q} \times \frac{\Delta q}{\Delta p}$$

PPT
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question 2 :-

$P_1 = 2 \downarrow$ $\quad q_1 = 10 \uparrow$

$e_p = -1$ $\quad P = 10$ $\quad P_1 = 10 - 2 = 8$

$$1 = \frac{10}{x} \times \frac{10}{2}$$

$$= \frac{50}{x} = 25 \quad \frac{50}{x}$$

$$x = 50$$

Q) $Q_1 = 5 \downarrow$ $P_1 - 1 \uparrow$ $P - ?$

$e_p = -1.5$ $Q = 60$ $Q_1 = 55$

$$e_p = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$$

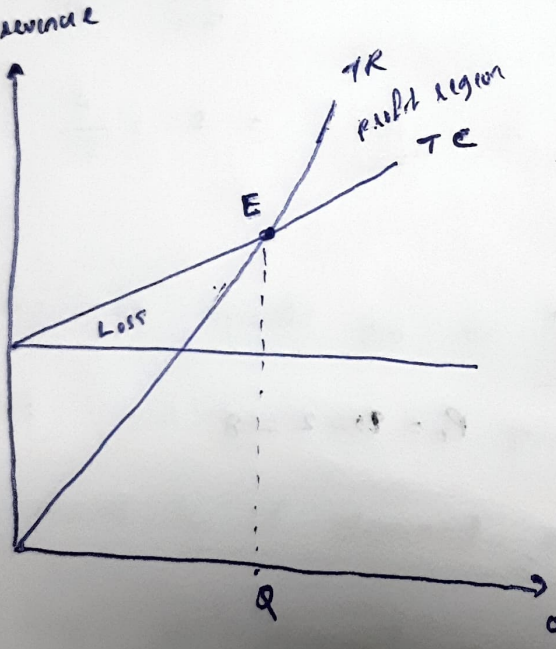
$$1.5 = \frac{P}{60} \times \frac{5}{1}$$

$$1.5 = \frac{P}{12}$$

$$P = 1.5 \times 12 = 18$$

imp

Break even analysis



TR ? TC

TR - total revenue

TC - total cost

E - break even point

Total Fixed cost

profit - TR > TC

loss - TR < TC

at E there is no profit no loss

Q - break even output/sales

TC = TFC + TVC

AC = AFC + AVC

average cost

Q $\qquad$ $\frac{}{Q}$ $\qquad$ $AC = \frac{TC}{Q}$

At Break even point

$TC = TR$

$P \rightarrow$ price of the product

$Q_b \rightarrow$ break even output

$TR \rightarrow$ Price of product * no of quantity

$$Q_b = \frac{TFC}{P - AVC}$$

where P-AVC is called contribution

contribution consists both fixed ~~profit~~ cost and profit

$$Q_b = \frac{TFC}{PV_{ratio}}$$

$$PV_{ratio} = \frac{\text{contribution}}{\text{sales}}$$

$$PV_{ratio} = \frac{S - V}{S}$$

S - selling price

V - variable price

Profit = total revenue - total cost

Margin of safety = Sales - break even

Q) Suppose a firm makes candles and every month it has to pay 3000 as rent and of Rs. 3000 as interest charges. If the selling price of a candle is Rs. 5 and variable cost per candle is Rs. 2

i) Estimate the break even level of output

$Q_b = ?$

TFC = 3000 + 3000 = 6000

P = 5

AVC = 2

$$Q_b = \frac{TFC}{P - AVC} = \frac{6000}{5-2} = \frac{6000}{3} = 2000 \text{ unit.}$$

ii) If the sale is 5000 candles what will be the profit

Profit = total revenue - total cost

total revenue = P x Q

= 5 x 5000 = 25000

total cost = TFC + TVC

= 6000 + (AVC x Q)

= 6000 + (2 x 5000)

= 6000 + 10000 = 16000

Profit = 25000 - 16000 = 9000 Rs

iii) To get a profit of Rs 15000 how many candles are do be produ

Profit = Total revenue - total cost

$$15000 = (P \times Q) - (TFC + TVC)$$

$$= (5 \times Q) - (6000 + (AVC \times Q))$$

$$= 5Q - (6000 + 2Q)$$

$$15000 = 5Q - 6000 - 2Q$$

$$21000 = 3Q$$

$$= 7000$$

iv) if the sale is 5000 cards what is the margin of safety

margin of safety = sales - break even sales

= 5000 - 2000 Q_b = break even sales

= 3000

v) Estimate profit volume ratio and break even sales

$$PV_{ratio} = \frac{S - V}{S}$$

$$= \frac{5-2}{5} = \frac{3}{5} = 0.6 \text{ in \%}$$

$$= 60\%$$

$$\text{break even sales} = \frac{FC}{PV_{ratio}}$$

$$= \frac{6000}{0.6} = 10000 \text{ Rs.}$$

2000 units here in Rupees (differentiate)

vi) if the firm wants to bring down the break even output to 1500 what should be the price

$$Q_b = 1500$$

$$Q_b = \frac{FC}{P - AVC}$$

$$1500 = \frac{6000}{P - 2}$$

$$P - 2 = \frac{6000}{1500} = 4$$

$$P = 4 + 2 = 6 \text{ Rs}$$

Cobb - Douglas production

$Q = AL^{\alpha} K^{\beta}$

K - capital

L - labour

α and β :- output elasticity

A :- total factor productivity (constant)

$\alpha + \beta = 1$ returns to scale constant (one percent)

$\alpha + \beta < 1$ decrease returns to scale

$\alpha + \beta > 1$ increase returns to scale

Q) Production fn is given as $Q = AL^{\alpha} K^{\beta}$

derive marginal product of labour and capital

Ans Marginal product of Labour

$$MP_L :- \frac{dQ}{dL}$$

$$= AL^{\alpha-1} \cdot A\alpha L^{\alpha-1} \cdot K^{\beta}$$

$$= A\alpha \frac{L^{\alpha}}{L} K^{\beta}$$

$$= \alpha \frac{AL^{\alpha} K^{\beta}}{L}$$

$$= \frac{Q\alpha}{L}$$

$\frac{Q}{L}$ - $\frac{\text{total product}}{\text{no. of units of labour}}$ } Avg product of labour

$MP_L = \alpha \cdot AP_L$

Marginal product of capital

$$MP_K = \frac{dQ}{dK}$$

$= \frac{AL^{\alpha}\beta K^{\beta-1}}{K}$

$= AL^{\alpha}K^{\beta}\frac{\beta}{K}$

$= \frac{Q\beta}{K} = \frac{\beta Q}{K} = \beta AP_K$

6) Suppose the production fn is given as $Q = 2K^{1/2}L^{1/2}$

i) what will be the output if $K = 16$ $L = 36$

ii) what is marginal product of labour when $K = 16$ and $L = 36$

iii) what is the avg product of capital " "

iv) find the no of units of capital required to produce 40 units of output if L is 25

ans

i) $Q = 2 \times 16^{1/2} 36^{1/2}$

$= 2 \times 4 \times 6 = 48$

ii) $MP_L = \frac{Q\alpha}{L} = \frac{48 \times \frac{1}{2}}{36} = \frac{24}{36} = \frac{2}{3} =$

$= \frac{dQ}{dL} \cdot A\alpha L^{\alpha-1}K^{\beta}$

$= 2 \times \frac{1}{2} 36^{1/2-1} 16^{1/2}$

$= 36^{-1/2} \times 4$

$= \frac{1}{6} \times 4 = \frac{4}{6} = \frac{2}{3}$

iii) $MP_K = AP_K = \frac{Q}{K} = \frac{48}{16} = 3$

iv) $40 = 2 \times 25^{1/2} \times K^{1/2}$

$4 = 5K^{1/2}$

$K = 4^2 = 16$

Q) $Q = 3 \times L^{1/2} K^{1/2}$ if Labour is increased by 10% what will be the increase in output

Ans $Q = 3 \times L^{1/2} K^{1/2}$

Logarithmic w.r.t Q

$$\log Q = \log 3 + \frac{1}{2}\log^{L} + \frac{1}{2}\log^{K}$$

$$\frac{dQ}{dQ} \qquad \frac{dQ}{dQ}$$

$$\frac{1}{Q} \times dQ = 0 + \frac{1}{2}\frac{1}{L} dL + \frac{1}{2}\frac{1}{K} dK$$

$$= \frac{1}{2} \times 10 + 0$$

$$\frac{dQ}{Q} = 5\%$$