

• Elasticities of Demand :-

There are many elasticities of demand based on the factors of demand :

i). The price elasticity

ii). The income elasticity

iii). Cross elasticity (depends of price of related goods)
except these all; other factors of demand such as taste, advertisement, population can be also act as a elasticities of demand.

1). Price elasticity of demand :-

The price elasticity is a measure of responsiveness of demand to change in the commodity's own price. If the changes in price are very small we use as a measure of the responsiveness of demand "the point elasticity of demand". And if the changes in price are not small we use the arc elasticity of demand as the relevant measure (greater than 5% change in price).

$$\text{Price elasticity of demand} = \frac{\text{Proportionate change in quantity demanded}}{\text{very small proportionate change in price (less than 5\%)}}$$

IMPORTANT NOTES

A wise man does not need advice and a fool won't take it.

2017

$$e_p = \frac{\frac{dQ}{Q}}{\frac{dP}{P}}$$

or,

$$e_p = \frac{dQ}{dP} \cdot \frac{P}{Q} \quad \text{--- (i)}$$

If demand is linear then;

$$Q = b_0 - b_1 P$$

$$\text{its slope is } = -\frac{dQ}{dP} = -b_1 \quad \text{--- (ii)}$$

Substituting eqⁿ (ii) in eqⁿ (i), we get;

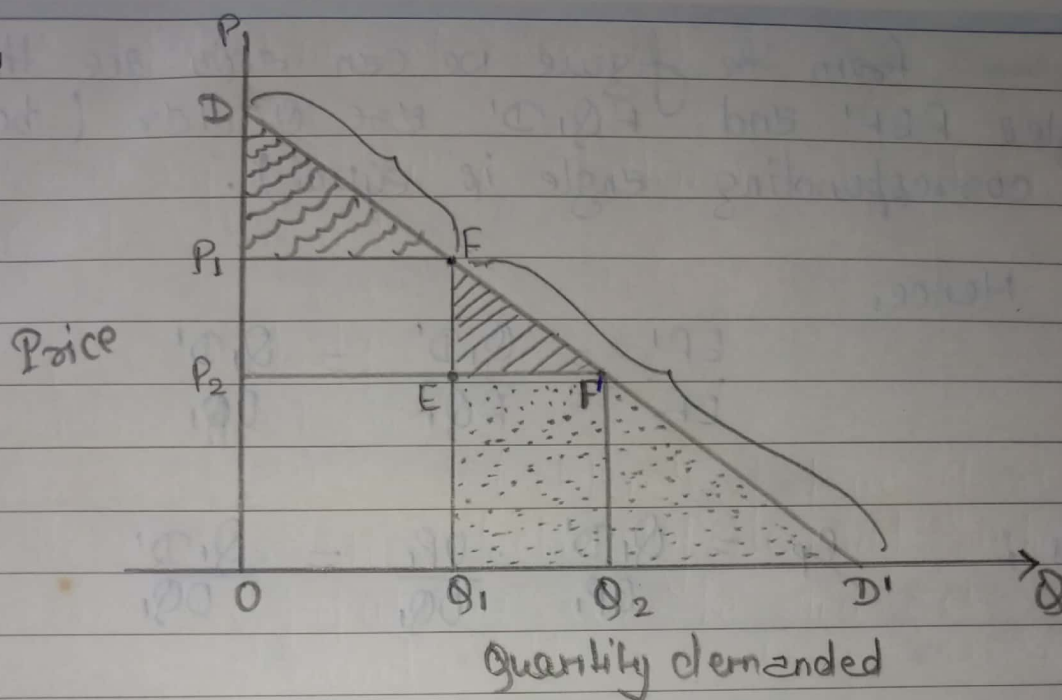
$$e_p = -b_1 \cdot \frac{P}{Q}$$



which determines that the elasticity changes at the various points of the linear-demand curve.

IMPORTANT NOTES

Graphically, the point elasticity of a linear-demand curve is shown by the ratio of segments of the line to right end to the left of the particular point.



Proof $\Rightarrow$

$$\Delta P = P_1 P_2 = EF$$

$$\Delta Q = Q_1 Q_2 = EF'$$

$$P = OP_1$$

$$Q = OQ_1$$

If we consider very small changes in P and Q , then $\Delta P \approx dP$ and $\Delta Q \approx dQ$. Thus, substituting in the formula for the point elasticity, we get:

IMPORTANT NOTES

$$e_p = \frac{dQ}{dP} \cdot \frac{P}{Q} = \frac{Q_1 Q_2}{P_1 P_2} \cdot \frac{OP_1}{OQ_1} = \frac{EF'}{EF} \cdot \frac{OP_1}{OQ_1}$$

From the figure we can also see that the triangles FEF' and FQ_1D' are similar (because each corresponding angle is equal).

Hence,

$$\frac{EF'}{EF} = \frac{Q_1D'}{FQ_1} = \frac{Q_1D'}{OP_1}$$

Thus;
$$e_p = \frac{Q_1D'}{OP_1} \cdot \frac{OP_1}{OQ_1} = \frac{Q_1D'}{OQ_1}$$

Furthermore, the triangles DP_1F and FQ_1D' are similar, so that;

$$\frac{Q_1D'}{FD'} = \frac{P_1F}{FD} = \frac{OQ_1}{FD}$$

Rearranging we obtain;

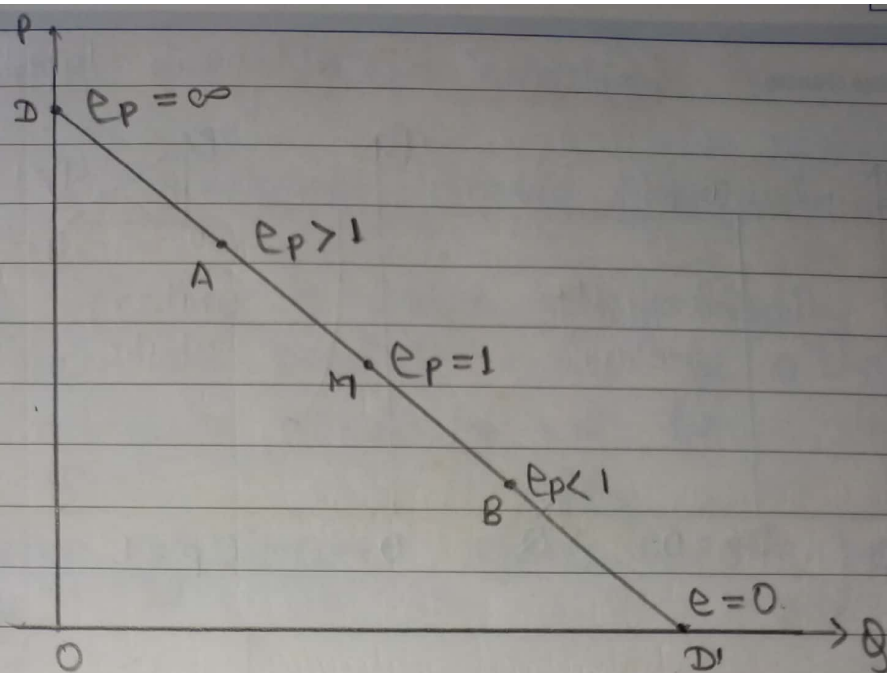
$$\frac{Q_1D'}{OQ_1} = \frac{FD'}{FD}$$

Thus, the price elasticity at point F is

IMPORTANT NOTES

Point elasticity $\Rightarrow$

$$e_p = \frac{Q_1D'}{OQ_1} = \frac{FD'}{FD} = \frac{\text{lower segment}}{\text{upper segment}}$$



- Note :- the price elasticity is always '-ve' because of the inverse relationship b/w Q (demand) and P (price) implied by the "law of demand". However, traditionally the -ve sign is omitted when writing the formulae the elasticity.

• Range of elasticity = $\{ 0 \leq E_P \leq \infty \}$

i). $E_P = 0 \Rightarrow$ demand is perfectly inelastic

ii). $E_P = 1 \Rightarrow$ demand has unitary elasticity

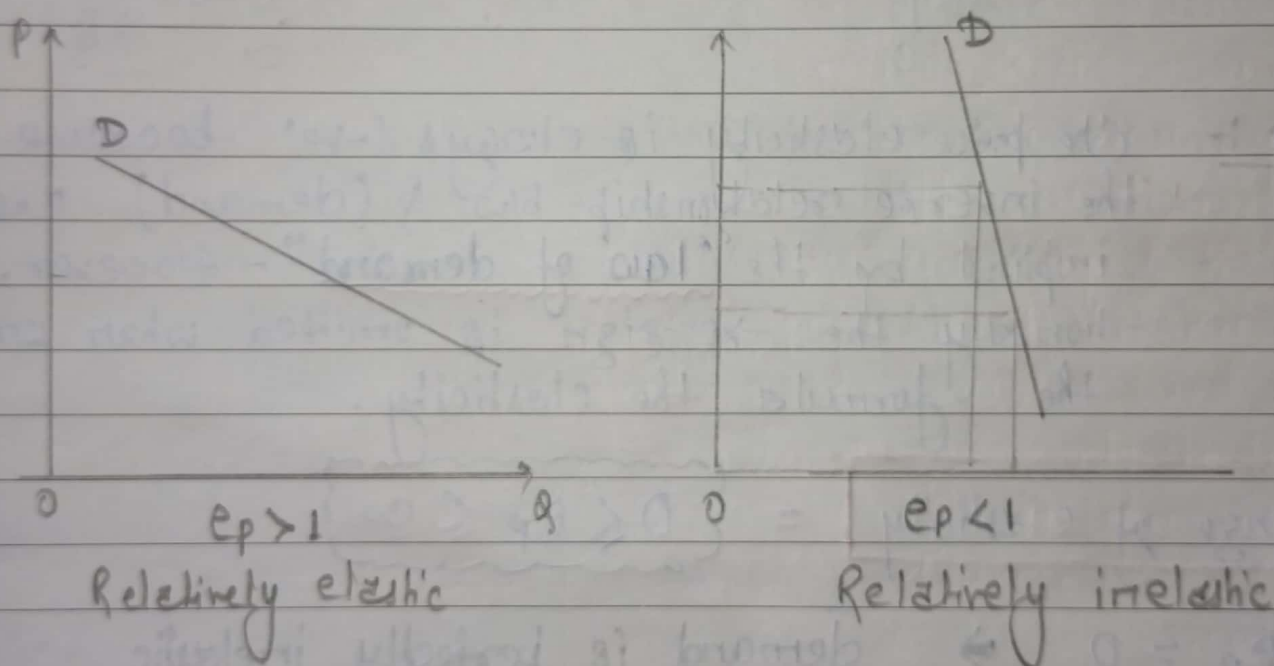
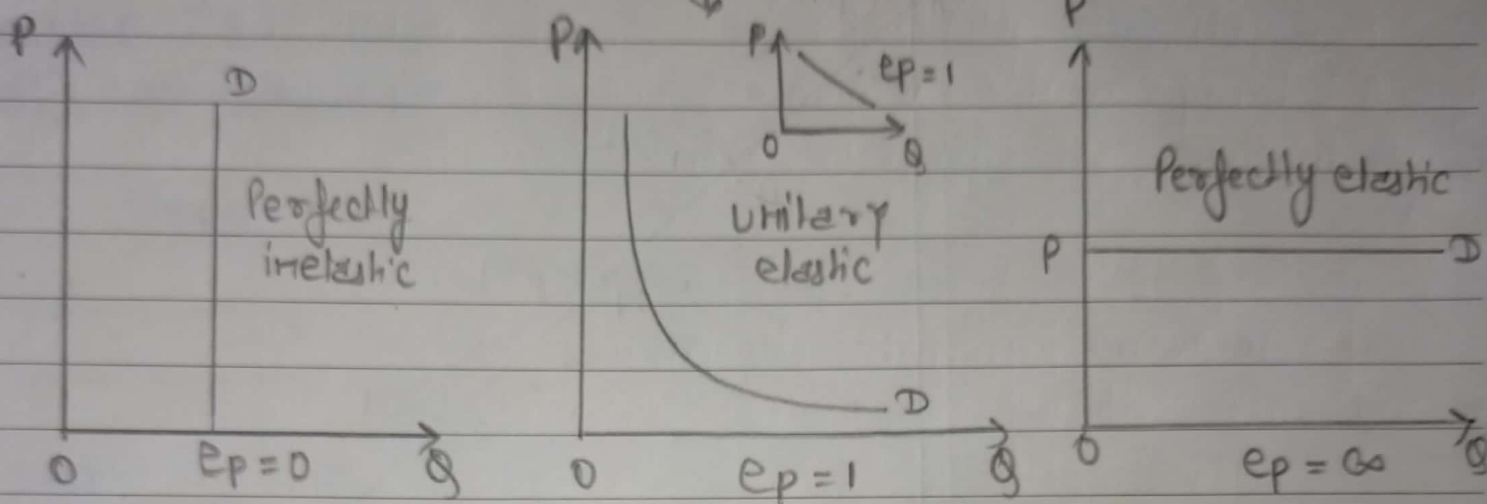
iii). $E_P = \infty \Rightarrow$ demand is perfectly elastic

IMPORTANT NOTES

iv). $0 < e < 1 \Rightarrow$ demand is inelastic in this range

v). $1 < e < \infty \Rightarrow$ demand is elastic in this range.

rectangular hyperbola



The basic determinants of the elasticity of demand of a commodity w.r.t its own price are :-

- i) The availability of substitutes, the demand for a commodity is more elastic if there are close substitutes for it.
- ii) The nature of the need that the commodity satisfies. In general, luxury goods are price elastic, while

The depth of your mythology is the extent of your effectiveness.

necessities are price inelastic.

ii). The time period. Demand is more elastic in the long-run.

iv). The number of uses to which a commodity can be put. The more the possible uses of a commodity the greater its price elasticity will be.

v). The proportion of income spent on the particular commodity.

The above formula for the price elasticity is applicable only for infinitesimal changes in the price. If the price changes appreciably we use the following formula, which measures the arc elasticity of demand.

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

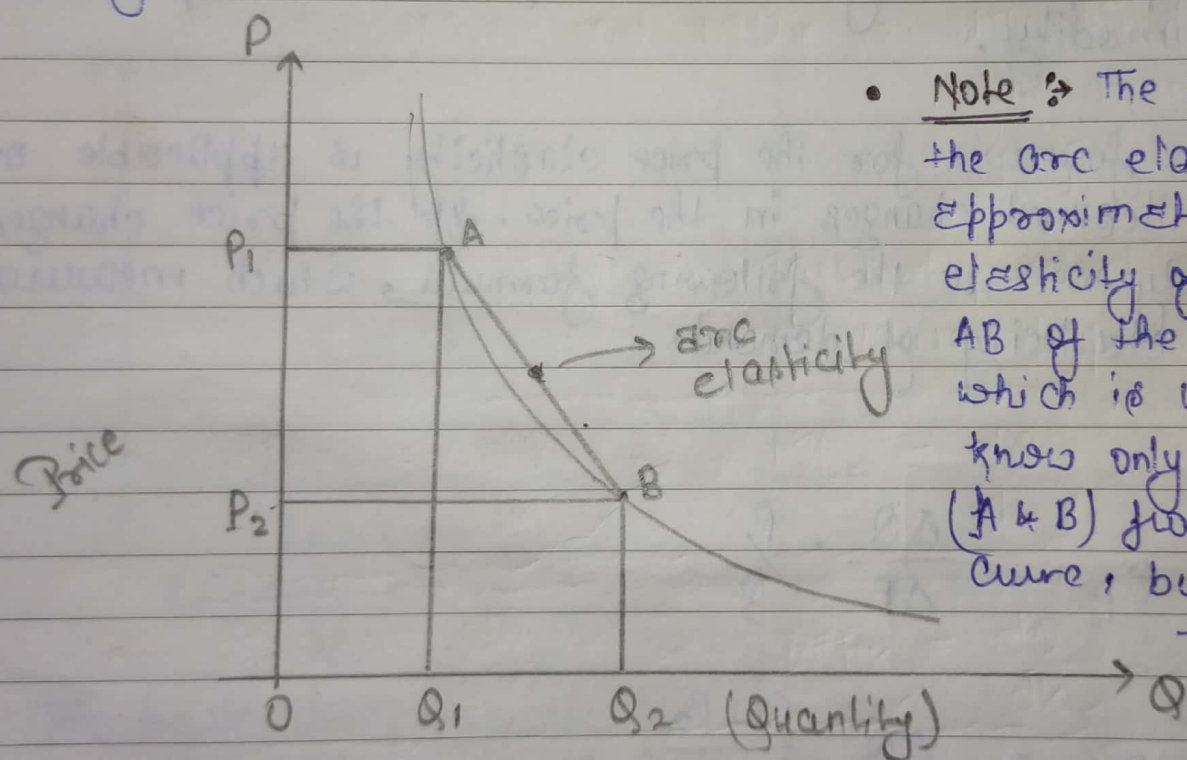
$$e_p = \frac{\Delta Q}{\Delta P} \cdot \frac{\frac{P_1 + P_2}{2}}{\frac{Q_1 + Q_2}{2}}$$

IMPORTANT NOTES

$$\therefore \left\{ e_p = \frac{\Delta Q}{\Delta P} \cdot \frac{P_1 + P_2}{Q_1 + Q_2} \right\}$$

The arc elasticity is a measure of the average elasticity, i.e., the elasticity at the mid point of the chord that connects two points (A and B) on the demand curve defined by initial & new price level.

→ More convex to the origin the demand curve is, poorer the linear approximation obtained by the arc elasticity formula.



• Note → The measure of the arc elasticity is an approximation of the true elasticity of the section AB of the demand curve, which is used when we know only the two points (A & B) from the demand curve, but not the intermediate one.

ii) The Income elasticity of demand :-

IMPORTANT NOTES

$$\text{Income elasticity of demand} = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in income}}$$

The world is but a canvas to the imagination.

Wk	M	T	W	T	F	S	S	Wk	M	T	W	T	F	S	S
05			1	2	3	4	5	09			1	2	3	4	5
06	6	7	8	9	10	11	12	10	6	7	8	9	10	11	12
07	13	14	15	16	17	18	19	11	13	14	15	16	17	18	19
08	20	21	22	23	24	25	26	12	20	21	22	23	24	25	26
09	27	28						13	27	28	29	30	31		

FRIDAY

Week - 03 • Days 020

JANUARY

20

Appointments / Meetings / Planning

i). +ve income elasticity = Normal good

ii). A commodity is considered a "luxury" if its income elasticity is greater than unity. $[E_p > 1]$ iii). A commodity is a "necessary" if its income elasticity is small (less than unity, usually) $[E_p < 1]$ iv) The cross-elasticity of demand $\Rightarrow$ Cross elasticity of demand = $\frac{\text{Proportional change in quantity demanded of good X}}{\text{Proportional change in the price of good Y}}$

$$E_{xy} = \frac{dQ_x}{Q_x} / \frac{dP_y}{P_y}$$

$$E_{xy} = \frac{dQ_x \cdot P_y}{dP_y \cdot Q_x}$$

cross elasticity depends on the nature of substitute good & complementary good

• Sign of cross elasticity is "-ve" $\Rightarrow$ if X and Y are complementary goods.

IMPORTANT NOTES

• Sign of cross elasticity is "+ve" $\Rightarrow$ if X and Y are substitutes.

• Higher the value of cross elasticity $\Rightarrow$ higher will be the degree of substitutability.

Having one child makes you a parent; having two makes you a referee.

BY - Mona

Complementary goods of X & Y.