

Price elasticity of demand.

$$2p^2 + 3q^2 = 100. \quad (1)$$

Find the elasticity of demand in terms of p and in terms of q .

$$\frac{d}{dp} (2p^2 + 3q^2) = 100$$

$$4p + 6 \frac{dq}{dp} q = 0 \Rightarrow \frac{dq}{dp} = -\frac{4p}{6q} = -\frac{2}{3} \frac{p}{q}$$

$$(1) \Rightarrow 2p^2 = 100 - 3q^2$$

$$p = \sqrt{\frac{100 - 3q^2}{2}}$$

$$E = \frac{p}{q} \frac{dq}{dp} = \frac{1}{q} \sqrt{\frac{100 - 3q^2}{2}} \left(-\frac{2}{3} \frac{p}{q} \right)$$

$$E = -\frac{2}{3q^2} \sqrt{\frac{100 - 3q^2}{2}}$$

in terms of q

$$(1) \Rightarrow 3q^2 = 100 - 2p^2$$

$$q = \sqrt{\frac{100 - 2p^2}{3}}$$

$$E = \frac{p}{\sqrt{\frac{100 - 2p^2}{3}}} \left(-\frac{2p}{3} \frac{1}{q} \right)$$

$$E = -\frac{2}{3} \frac{p^2}{\left(\sqrt{\frac{100 - 2p^2}{3}} \right)^2}$$

$$E = -\frac{2p^2}{100 - 2p^2} = -\frac{p^2}{50 - p^2}$$

$$\boxed{E = -\frac{p^2}{50 - p^2}} \text{ in terms of } p.$$