MAT 1700

LØSNINGSFORSLAG

SEMINAR #10

Oppgave 1

Profit-max pris (p^*) og mengde (q^*)

$$R = p \cdot q = 12q - q^2$$

$$MR = 12 - 2q = MC = q$$

$$q^* = 12/3 = \underline{\underline{4}}$$

$$p^* = 12 - 4 = \underline{\underline{8}}$$

Oppgave 2 Konstant elasticity

$$q = 100p^{-2}$$

Etterspørselens pris-elastisitet er konstant $= -2$ langs hele etterspørselskurven.

$$MR = p + q\frac{\Delta p}{\Delta q} = p\left[1 + \frac{q}{p}\frac{\Delta p}{\Delta q}\right] \quad \text{since } \epsilon_{q,p} = \frac{p}{q}\frac{\Delta q}{\Delta p}$$

$$= p\left[1 + \frac{1}{\epsilon_{q,p}}\right]$$

Profitt-betingelsen maksimerende;

$$MR = MC \Rightarrow p^*\left[1 + \frac{1}{\epsilon_{q,p}}\right] = mc(q^*)$$

$$p^* + \frac{p^*}{\epsilon_{q,p}} = mc(q^*)$$

oppgave 2, forts

$mc = 50$

$$p^* e_{q,p} + p^* = mc(q^*)\, e_{q,p}$$

$$e_{q,p}\left[p^* - mc^*\right] = p^*$$

$$e_{q,p}\left[\frac{p^* - mc^*}{p^*}\right] = 1 \Rightarrow \frac{p^* - mc^*}{p^*} = \frac{-1}{e_{q,p}}$$

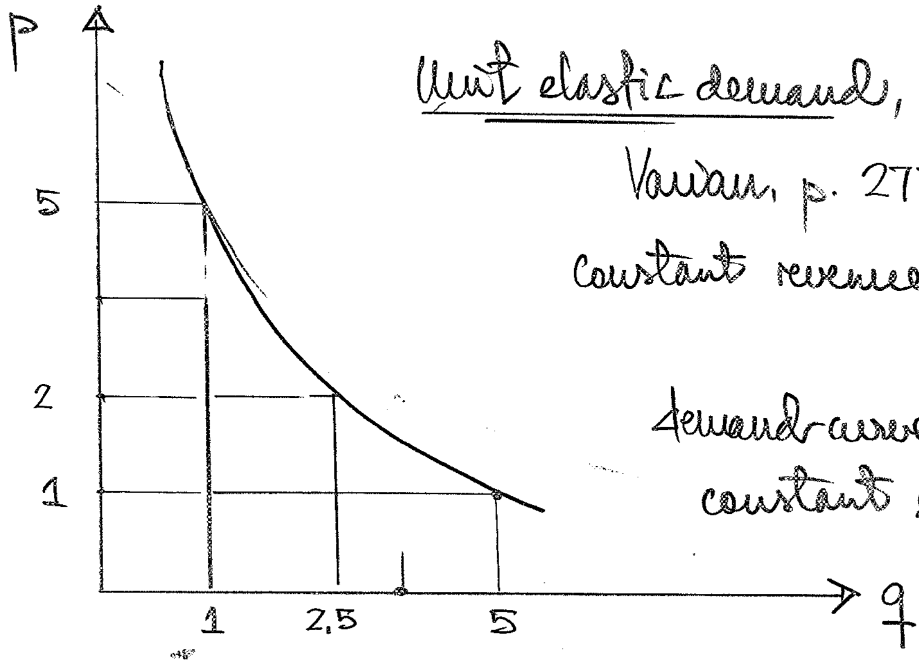
profit-max pris, p^* gitt const. elasticity $= \underline{\underline{-2}}$

$$\frac{p^* - 50}{50} = -\frac{1}{-2} = 1/2 \; ; \; p^* = \underline{\underline{75}}$$

(b) Demon $q = 100P^{-5}$ $\Rightarrow$ constant elasticity $= \underline{\underline{-5}}$

$$\frac{p^* - 50}{50} = -\frac{1}{-5} \Rightarrow p^* = \underline{\underline{60^{00}}}$$

General form: $q = Ap^{\epsilon}$



Unit elastic demand,

Varian, p. 277

constant revenue

$q = \ln A + \epsilon \ln p$

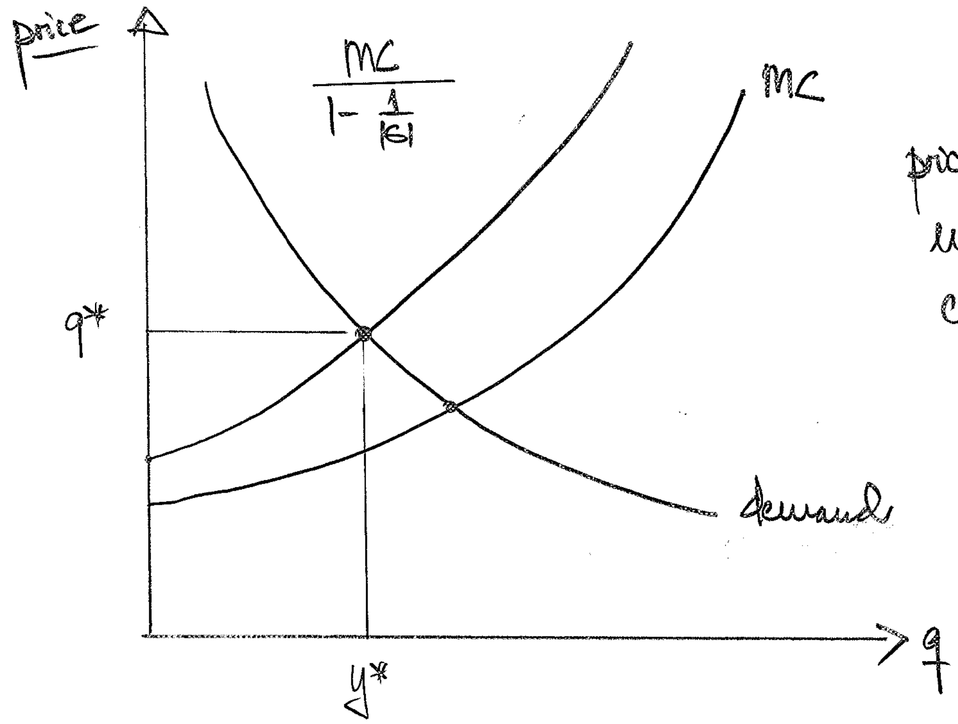
demand-curve exhibits constant elasticity

Oppgave 2, con't

const. elasticity of demand

⇒ revenue will not change when price changes by small amount

⇒ constant revenue for all changes in price, demand curve has elasticity of −1 everywhere



price charged = constant markup on marginal cost.

Varian, page 428
Fig 24.2

Oppgave 3

$$P = 100 - \frac{1}{2} q \qquad MC = 50$$

$$2P = 200 - q$$

$$q = 200 - 2p$$

Linear demand curve

price-elasticity of demand not a single number; rather, it is given by the formula derived from the expression for elasticity;

$$e_{q,p} = \frac{p}{q} \frac{\Delta q}{\Delta p}$$

where $\Delta q / \Delta p = \underline{-2} \Rightarrow e_{q,p} = -2 \frac{p}{q} = -\frac{2p}{200 - 2p}$

Inverse elasticity pricing rule (IEPR)

$$\frac{P - MC}{p} = -\frac{1}{e_{q,p}} \Rightarrow \frac{P - 50}{50} = \frac{200 - 2p}{2p} \; ; \; \underline{\underline{p^* = 75}}$$

$$q^* = 200 - 2(75) = \underline{\underline{50}}$$

$$\text{Mark-up pricing} = p^* - MC = 75 - 50 = 25$$

- <u>or</u> - <u>alternatively</u>;

$$TR = (p \cdot q) = 100q - \frac{1}{2} q^2$$

$$MR = 100 - 2q$$

$$MR = 100 - q = MC = 50$$

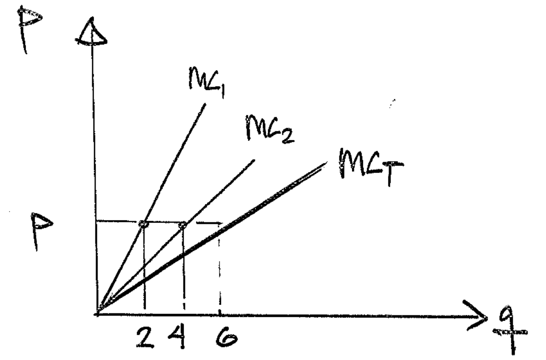
$$\underline{\underline{q^* = 50}}$$

Oppgave 4

$P = 120 - 3q$ etterspørselskurven

$MC_1 = 10 + 20q_1$ $\quad MC_2 = 60 + 5q_2$

Monopolist's multiplant marg. cost curve; horizontal summation of marg. cost curves of individual plants



Adding two marg. cost curves gives vertical summation
⇒ horizontal summation by inverting each marg. cost curve by expressing q as a ftn. of MC

$-20q_1 = 10 - MC_1$
$q_1 = -\frac{1}{2} + \frac{1}{20} MC_1$

$-5q_2 = 60 - MC_2$
$q_2 = -12 + \frac{1}{5} MC_2$

$q_T = q_1 + q_2 = -12{,}5 + 0{,}25\, MC_t$

$\Rightarrow MC_T = 50 + 4q_T$ ≡ multiplant marg. cost curve

$R = 120q - 3q^2 \Rightarrow MR = 120 - 6q$

$MR = MC \Rightarrow 120 - 6q = 50 + 4q;\ q^* = \underline{\underline{7}}$

$p^* = 120 - 3(7) = \underline{99}$

$MC_T = 50 + 4(7) = \underline{78}$

Oppgave 4, con't

$$q_1 = -\frac{1}{2} + \frac{1}{20}(78) = 3.4$$

$$q_2 = -12 + \frac{1}{5}(78) = 3.6$$

Oppgave 5

$$TC = 1200 + 0{,}5\,q^2$$

$$MR = MC$$

$$300 - 2q = q\ ; \quad q^* = \underline{\underline{100}}$$

$$p^* = 300 - 100 = \underline{\underline{200}}$$

$$TC = 1200 + .5(100^2) = \underline{\underline{6200}}$$

$$q = 300 - P$$

$$\epsilon_{q,p} = \frac{\Delta q}{\Delta p}\frac{p}{q} \qquad \frac{\Delta q}{\Delta p} = -1$$

$$\epsilon_{q,p} = -1\left(\frac{200}{100}\right) = \underline{\underline{-2}}$$

$$\frac{p - mc}{p} = \frac{1}{\epsilon_{q,p}} \Rightarrow \frac{200 - mc}{200} = \frac{-1}{-2}$$

$$mc = \underline{\underline{100}}$$

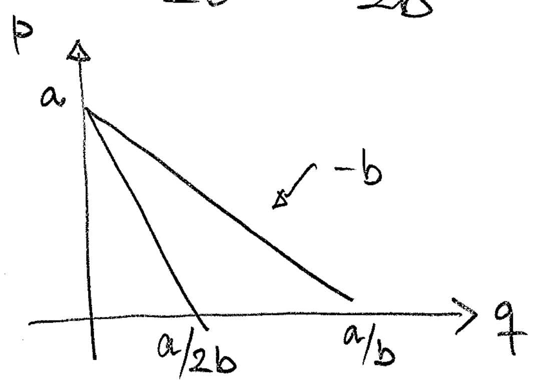
$$\pi = TR - TC = p^* q^* - (1200 + .5(100)^2) = 20{,}000 - 6200 = \underline{\underline{13800}}$$

Oppgave 6

Linear demand curve; price up by ½ the change in cost, ie. by $3^{\underline{00}}$.

$$a - 2by = c + t\ ; \quad y = \frac{a-c-t}{2b}\ ; \quad \frac{\Delta y}{\Delta t} = -\frac{1}{2b}$$

$$\frac{\Delta p}{\Delta t} = -b\left(-\frac{1}{2b}\right) = \frac{1}{2}$$



Seminar #10

Oppgave 7

Monopolist operates where:

$$p(y) + y \cdot \frac{\Delta p}{\Delta y} = MC(y)$$

$$p(y) = MC(y) - y\frac{\Delta p}{\Delta y}$$

$\frac{\Delta p}{\Delta y} < 0$ since demand curves → slope < 0

then ⇒ $p(y) > MC(y)$