MAT 1700

Løsningsforslag

Oppgaveseminar # 9

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Oppgave 1 – (Ref oppgave 3 Oppgaveseminar 8)

$$Q = K^{1/2} L^{1/4} M^{1/4}$$

$r = 2$; $w = 16$; $m = 1$

$L = Q/8$; $M = 2Q$; $K = 2Q$

(Løsning langsiktig kostn. minimum)

LTC ≡ langsikt. tot. costnad

$= wL + m.M + rK = 16(Q/8) + 1(2Q) + 2(2Q)$

$= \underline{8Q}$

LAC ≡ langs. gj.snittlig kostnad $= AC(Q) = \frac{8Q}{Q} = 8$

(b) Kortsikt. kost-min. innsatsfaktorene for L og M

$$MP_L/MP_M = \frac{M}{L} = \frac{w}{m} = \frac{16}{1} \Rightarrow M = 16L$$

$$MP_L/MP_K = \frac{K}{L} = \frac{w}{r} = \frac{16}{2} \Rightarrow K = 2Q$$

$M = 2Q$

(Jfr. løsningsforslag oppgave 3 – seminar #8)

Oppgave 1, fortsettelse

$L = Q^2/4\bar{K}$ og $M = \frac{4Q^2}{\bar{K}}$

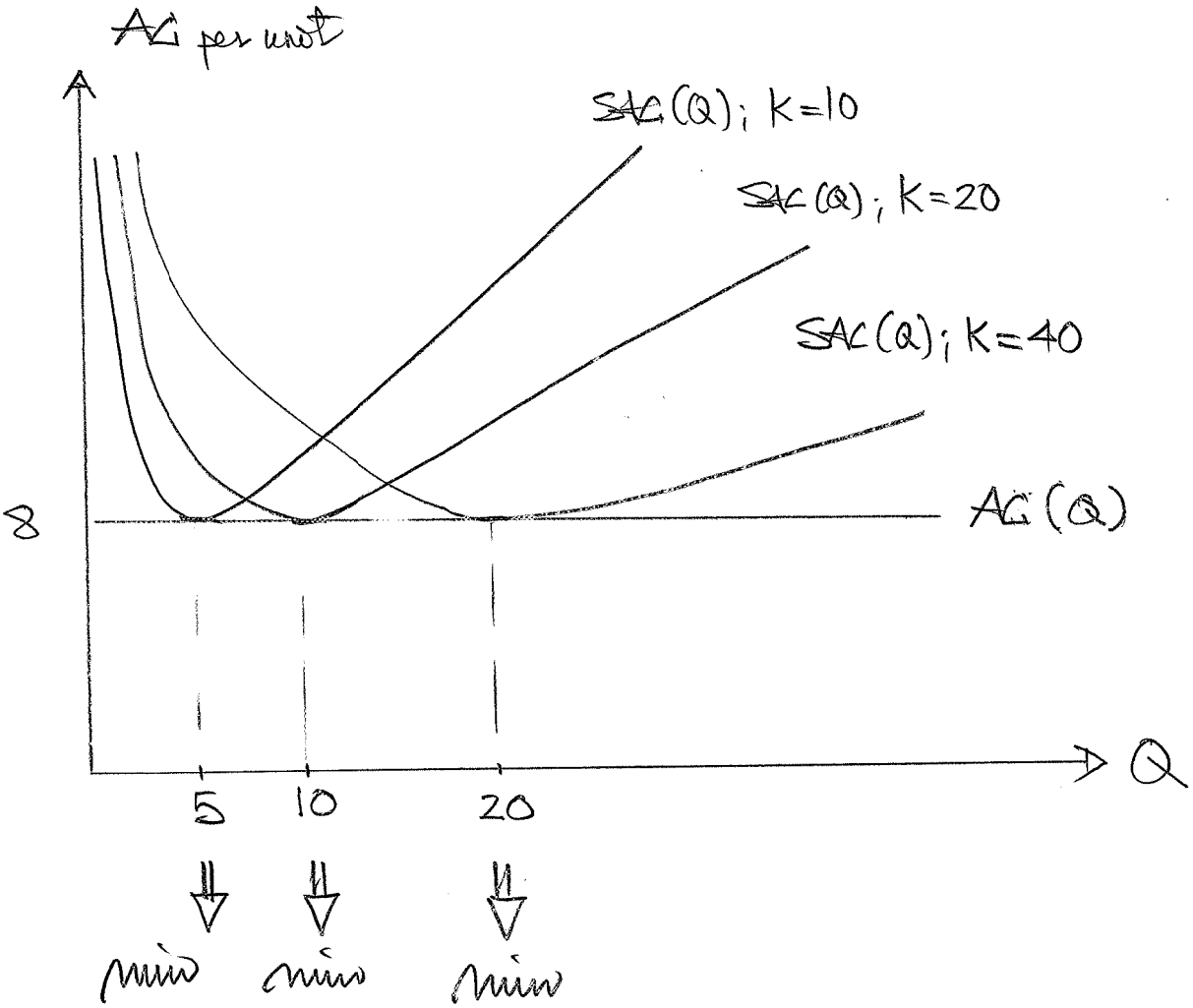
$STC(Q) \equiv$ kortsikt. tot. kostnad kurve

$$= \omega L + mM + r\bar{K} = \frac{16Q^2}{4\bar{K}} + 1\left(\frac{4Q^2}{\bar{K}}\right) + 2\bar{K}$$

$$= \frac{8Q^2}{\bar{K}} + 2\bar{K}$$

$$SAC(Q) = \frac{8Q}{K} + \frac{2\bar{K}}{Q} \equiv SAC(Q)$$

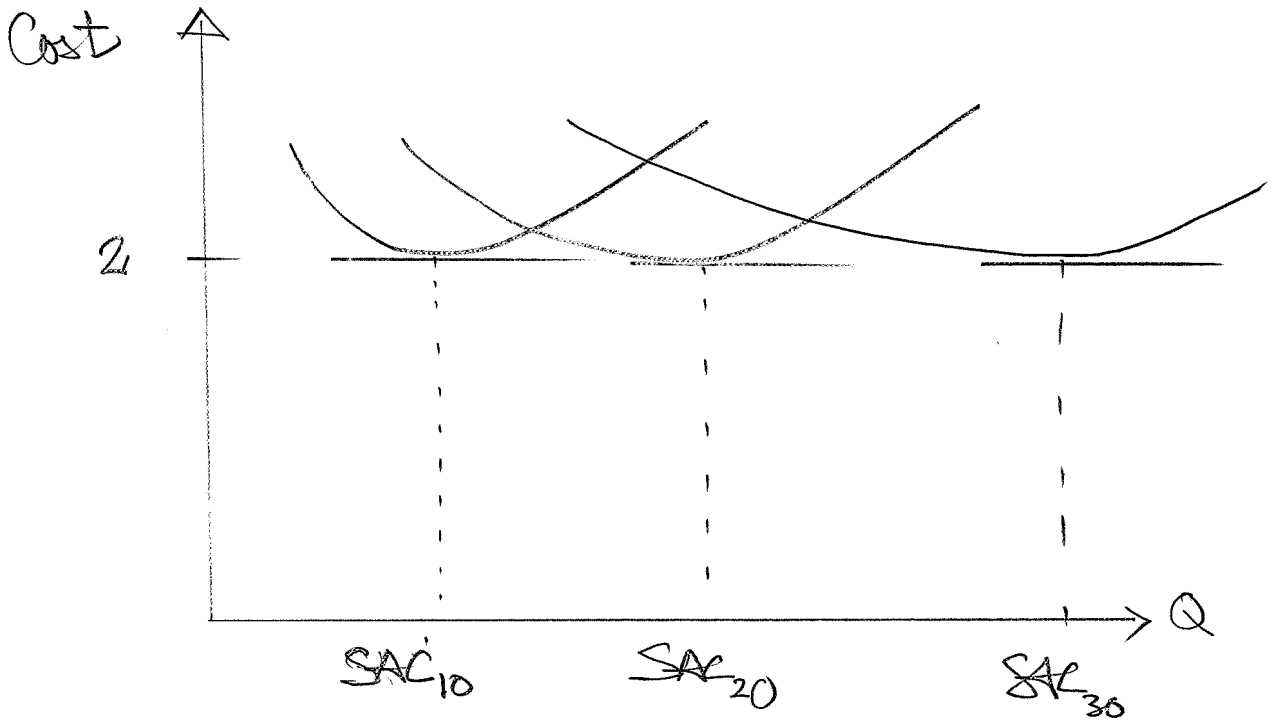
(a)



Oppgave 2

$$STC(Q) = \bar{K} + \frac{Q^2}{K}$$

$\min SAC_{10} =$



Oppgave 3

$$KTK(Q) = Q^2 + 20Q + 100$$

(a) $$AVC = \frac{Q^2 + 20Q}{Q} = 20 + Q$$

min $AVC \Rightarrow AVC = SMC$

$$20 + Q = 2Q + 20; \quad Q = 0$$

$\Downarrow$

$Q = 0$ gives $AVC = 20$ min var. cost

(b) $$S(P) = \begin{cases} 0 & \text{if } P < 20 \\ -10 + \frac{1}{2}P & \text{if } P \geq 20 \end{cases}$$

$P = 20 + 2Q \Leftrightarrow$ Price $=$ MC

$Q = -10 + \frac{1}{2}P$

Oppgave 4

$D(P) = 60 - P$

$KTK = 0.1 + 150\,Q^2$

$SMC = 300\,Q$

$AVC = 150\,Q$

(a) Short-run equilibrium

$300\,Q = P$

$s(P) = P/300$

Short-run equilibrium $\Rightarrow 300\left[\frac{P}{300}\right] = 60 - P$

$P = 30$

Production per firm $= 30/300 = 0.1$ unit per year

$D(P) = 60 - 30 = \underline{30}$

b) $SAC = \frac{STC}{Q} = \frac{0.1}{Q} + 150\,Q$

$Q = 0.1 \Rightarrow SAC = \frac{0.1}{0.1} + 150\,(0.1) = \underline{16}$ (per unit)

whereas $P = 30 \Rightarrow P > SAC$

Profit!

#5

Langsiktig marginalkostnad; $MC(Q)$

$$MC(Q) = 40 - 2Q + 0.03Q^2$$

$$= \frac{dTC(Q)}{dQ} = \frac{d[AC(Q) \times Q]}{dQ}$$

$$D(P) = 25000 - 1000P$$

P^* ≡ equilibrium price; n^* = equilibrium # of firms

(1) $P^* = 40 - 2Q^* + 0.03(Q^*)^2$ ... profit-max

(2) $P^* = 40 - Q^* + 0.01(Q^*)^2$ ... zero profit

(3) $n^* = \frac{25000 - 1000P^*}{Q^*}$ ... supply = demand

$$40 - 2Q^* + .03(Q^*)^2 = 40 - Q^* + 0.01(Q^*)^2$$

$$\Rightarrow 0.02(Q^*)^2 = Q^*; \quad \underline{Q^* = 50 \text{ (000) enheter}}$$

$$\underline{P^*} = 40 - 2(50) + 0.01(50)^2 = \underline{15}$$

$$\underline{n^*} = \frac{25000 - 1000(15)}{50} = \underline{200}$$

Oppgave # 6

$\bar{AV}$ (var. Kostn) ≡ gj.sn.lig var. kostnad $= \frac{TVC(Q)}{Q} = Q$

$\Rightarrow \bar{AVC} = Q$

Min. $\bar{AVC} \Rightarrow \bar{AVC} = MC(Q) = dTVC/dQ$

$Q = 2Q$; $Q^{min} = 0$

For $p = 0$; $Q = 0$

For $p > 0 \Rightarrow$ tilbud: $P = MC(Q)$

$P = 2Q$; $Q = \frac{1}{2}P$; ie.

$s(P)$ ≡ korts. tilb. kurve $= \frac{1}{2}P$ tilbydernes korts. tilbudskurve

(b) Horisontal summering av bedriftenes tilb. kurver.
Siden 20 identiske tilbydere (utgjør totalmarkedet);

$S(P) = 20\,s(P) = 10P$ markedets korts. tilb. kurve.

(c) Korts. likevektspris & mengde; $S(P) = D(P)$

$10P = 110 - P$; $P = 10$

$Q = 100$ $(= 110 - 10)$