Q5

(a) $$\max_{q} \ [\alpha - \beta q]q - cq - F$$

FOC $$\alpha - 2\beta q - c = 0$$

$$\Rightarrow \quad q^M = \frac{\alpha - c}{2\beta} \quad \checkmark$$

CHECK

$$\pi(q^M) = \left[\alpha - \frac{(\alpha - c)}{2}\right]\frac{(\alpha - c)}{2\beta} - c\frac{(\alpha - c)}{2\beta} - F$$

$$= \frac{(\alpha - c)^2}{4\beta} - F > 0.$$

So monopolist chooses $q^M = \dfrac{\alpha - c}{2\beta}$

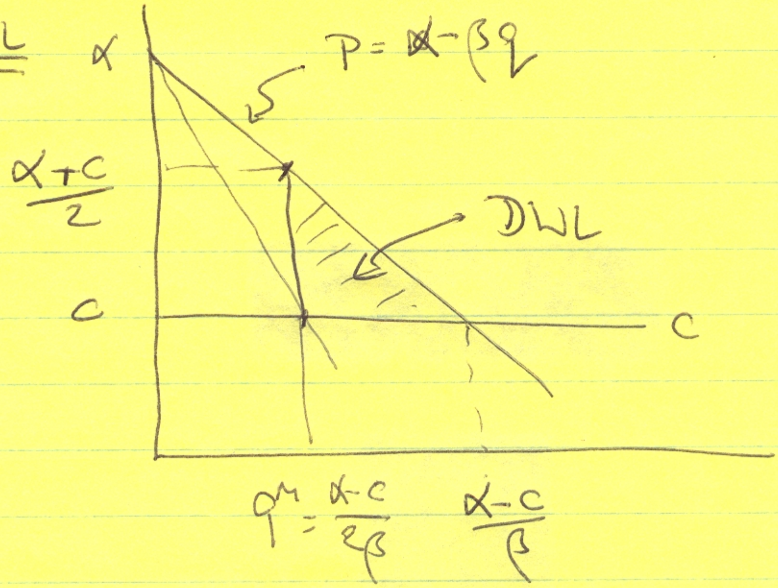
leading to price $\left[\dfrac{\alpha + c}{2}\right]$ and

profits $\dfrac{(\alpha - c)^2}{4\beta} - F > 0.$

(10)

Q5

(b) <u>DWL</u>



$$DWL = \frac{(\alpha + c)(\alpha - c)}{2 \times 2 \times 2\beta} = \frac{(\alpha^2 - c^2)}{8\beta} > 0$$

(11) Q5

(c) $CS(P) = \frac{(\alpha - P)\, q(p)}{2}$

$\Pi(P) = (P - c)\, q(p) - F$

$CS'(P) = -\frac{q(P)}{2} + \frac{(\alpha - P)\, q'(P)}{2}$

[But recall $P = \alpha - \beta q$ so $q(p) = \frac{\alpha - P}{\beta}$]

Hence $CS'(P) = -q(P)$

$\Pi'(P) = (P - c)\, q'(P) + q(P)$

So pblm $\max_{\langle P \rangle} CS(P) + \Pi(P)$ s.t. $-\Pi(P) \leq 0$

$\mathcal{L} = CS(P) + \Pi(P) + \lambda\, \Pi(P)$

FOC $\quad CS'(P) + (1+\lambda)\, \Pi'(P) = 0$

$\Rightarrow -q(P) + [1+\lambda]\left[(P-c)\, q'(P) + q(P)\right] = 0$

$\Rightarrow \frac{P - C}{P} = -\left(\frac{\lambda}{1+\lambda}\right) \frac{q(P)}{q'(P)\, P} = \frac{\lambda}{1+\lambda}\left(\frac{1}{\varepsilon}\right)$