Answers Practice Third Exam Math 1330 1 Nov 06

3A (a.) Revenue = price * quantity

$$R = p \cdot q = (-0.0117q + 10.417)q$$

More generally $R = pq = (-mq + b)q$

Costs = Variable costs + Fixed Costs

$$C = \$2.50q + \$50$$

More generally, $C = Uq + C_{Fixed}$

Hence Profit = Revenue − Costs $= R - C$

$$\pi(q) = (-0.0117q + 10.417)q - (2.5q + 50)$$

More generally $\pi(q) = (-mq + b)q - (Uq + C_{Fixed})$

(b.) Via calculator graph $\pi(q)$ and use fMax. to get $q = 338.333\ldots$, $\pi(338.333) = \$1289.29$

$p = \$6.46$

(d.) Via symbolic algebra $\frac{d\pi}{dq} = -2mq + b - U$

$\frac{d\pi}{dq} = 0$ if a max hence $0 = -2mq + (b-U)$

$\Rightarrow q = \frac{b-U}{2m}$ is critical point.

Note $\frac{d^2\pi}{dq^2} = -2m < 0$ so concave down $\Rightarrow$ critical pt is a maximum $\Rightarrow$ $q = \frac{b-U}{2m}$ and $p = -m\left(\frac{b-U}{2m}\right) + b$

Note b is price if $q = 0$

selling price $p = \frac{b}{2} + \frac{U}{2} = \frac{b+U}{2}$