Example 2.I: A monopolist firm faces the market demand given by $P = 10 - Q$. Consider the following questions if the cost function $C(Q) = 4Q$.

- What is the revenue-maximizing level of output?

revenue function $TR(Q)$

$= P(Q) \times Q = P(Q) \times Q$

$= (10 - Q) \times Q$

$= 10Q - Q^2$

at $Q = 5$, TR is max

$TR = 25$

slope $= \frac{\Delta TR}{\Delta Q} = 10 - 2Q$

maximum occurs when $\frac{\Delta TR}{\Delta Q} = 0$

$10 - 2Q = 0$

$Q = 5$

- What is the break-even output?

$\pi = 0 \rightarrow TR = TC$

$TR - TC = 0$

$[(10 - Q) \times Q] - [4Q \times Q] = 0$

$10Q - Q^2 - 4Q^2 = 0$

$-5Q^2 + 10Q = 0$

$-5Q(Q - 2) = 0$

$Q = 0, 2$

break-even output occurs when $Q = 2$

- What is the profit-maximizing level of output? 2 ways

① $MR = MC$

$\frac{\Delta TR}{\Delta Q} = \frac{\Delta TC}{\Delta Q}$

$4 = 10 - 2Q$

$6 = 2Q$

$Q = 3$

② $\pi = TR - TC$ $\quad TR = P \times Q$

$\frac{\partial \pi}{\partial Q} = 0 \rightarrow Q^*$

$\pi = TR - TC$

$\pi = 10Q - Q^2 - 4Q$

$\pi = 6Q - Q^2$

$\frac{d\pi}{dQ} = 6 - 2Q$

$0 = 6 - 2Q$

$Q = 3$

HW

DO NOT CIRCULATE

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