

Study Question-Profit Maximization

A firm has total revenue equation $TR = 5000Q - 5Q^2$
and total cost equation $C = 500 + 3Q^2$

Calculate this firm's profit maximizing price, quantity, total revenue, total cost, and total profit. (This firm does not price discriminate.)

Note that average revenue = $TR/Q = 5000 - 5Q$

Since average revenue equals price for a firm that does not price discriminate, this means that $P = 5000 - 5Q$ This is the demand equation for the firm's product.

Note that marginal revenue = $dTR/dQ \rightarrow MR = 5000 - 10Q$

Note that marginal cost = $dC/dQ \rightarrow MC = 6Q$

To find the profit-maximizing Q, set $MR=MC$ and solve for Q:

$$5000 - 10Q = 6Q \rightarrow Q = 312.5$$

To find the profit-maximizing price, plug in the value $Q = 312.5$ into the demand equation:

$$P = 5000 - 5(312.5) = 3437.5$$

Total revenue for a firm that does not price discriminate equals price times quantity:

$$\text{total revenue} = 3437.5 \times 312.5 = \$1,074,218.75$$

To find total cost, plug in $Q = 312.5$ into the total cost equation:

$$\text{total cost} = 500 + 3(312.5^2) = \$293,468.75$$

$$\text{total profit} = \text{total revenue} - \text{total cost} = \$780,750.00$$