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価格差別化Given Data

$$P_1 + Q_1 = 500$$

$$2 \cdot P_2 + 3 \cdot Q_2 = 720$$

$$\text{総コスト } TC = 50000 + 20Q$$

$$Q = Q_1 + Q_2, \quad P_1 \neq P_2$$

Unknown利潤最大化の時の P_1, P_2 演繹推論法

$$\begin{aligned} \pi &= P_1 \times Q_1 + P_2 \times Q_2 - (50000 + 20(Q_1 + Q_2)) \\ &= (500 - Q_1)Q_1 + \frac{720 - 3Q_2}{2} Q_2 - \\ &\quad (50000 + 20Q_1 + 20Q_2) \\ &= 500Q_1 - Q_1^2 + 360Q_2 - \frac{3}{2}Q_2^2 \\ &\quad - 50000 - 20Q_1 - 20Q_2 \\ &= 480Q_1 - Q_1^2 + 340Q_2 - \frac{3}{2}Q_2^2 - 50000 \end{aligned}$$

$\pi = TR - TC$
$TR = P_1 \cdot Q_1 + P_2 \cdot Q_2$
$f(Q_1, Q_2)$ の最大化
$\left\{ \frac{\partial f}{\partial Q_1} = 0, \frac{\partial f}{\partial Q_2} = 0 \right\}$

$$MR = MC$$

$$\frac{\partial \pi}{\partial Q_1} = 480 - 2Q_1 \rightarrow Q_1^* = 240$$

$$\frac{\partial \pi}{\partial Q_2} = 340 - 3Q_2 \rightarrow Q_2^* = \frac{340}{3}$$

$$P_1^* = 500 - Q_1^* = 260$$

$$P_2^* = \frac{720 - 340}{2} = 190$$

別解 MR=MC の公式を使う

$$\frac{\partial}{\partial Q_1} TR_1 = \frac{\partial}{\partial Q_1} TC_1 \quad 500 - 2Q_1 = 20 \rightarrow Q_1^* = 240$$

$$\frac{\partial}{\partial Q_2} TR_2 = \frac{\partial}{\partial Q_2} TC_2 \quad 360 - 3Q_2 = 20 \rightarrow Q_2^* = \frac{340}{3}$$

価格差別化計画

$$Q = Q_1 + Q_2$$

$$P_1 = P_2 = P$$

$$\pi = TR - TC$$

$$= P \times Q - (50000 + 20Q)$$

$$= (444 - \frac{3}{5}Q)Q - (50000 + 20Q)$$

$$\frac{d\pi}{dQ} = 444 - \frac{6}{5}Q - 20 = 0$$

$$424 = \frac{6}{5}Q, \quad Q^* = \frac{1060}{3}$$

$$P^* = 444 - \frac{3}{5} \times \frac{1060}{3} = \underline{232}$$

$$Q = Q_1 + Q_2$$
$$= 500 - P_1 + \frac{720 - 2P_2}{3}$$

$$= 500 - P_1 + 240 - \frac{2}{3}P_2$$

$$= 740 - \frac{5}{3}P$$

$$P = (740 - Q) \times \frac{3}{5}$$

$$= 444 - \frac{3}{5}Q$$