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1. 如果獨占廠商所面對的市場需求函數為
 $P = 60 - Q$, 成本函數為 $TC = 30Q$:

(A) 廠商採單一訂價, 求消費者剩餘, 生產者剩餘, 總剩餘及無謂損失

$$MR = 60 - 2Q, MC = 30 \Rightarrow MR = MC$$

$$60 - 2Q = 30$$

$$Q = 15, P = 45$$

$$\pi = 15 \times 45 - 30 \times 15 = 225$$

$$CS = \frac{15 \times 15}{2} = 112.5 \quad PS = 675 - 450 = 225$$

$$TS = 112.5 + 225 = 337.5$$

無謂損失:

(B) 採完全差別取價時, 求 CS, PS, TS, 無謂損失

$$P = MC \Rightarrow 60 - Q = 30, Q = 30, P = 30 \quad PS = 1350 - 900 = 450$$

$$\pi = \frac{30 \times 30}{2} + 30 \times 30 - 30 \times 30 \quad TS = 450$$

$$= 1350 - 900$$

$$= 450 \quad CS = 0$$

無謂損失 = 0

計算分割 2 個價格

(C) 採第二級差別取價時, 求 CS, PS, TS, 無謂損失

$$\pi = (60 - Q_1) \times Q_1 + (60 - Q_2) \times (Q_2 - Q_1) - 30Q_2$$

$$= 60Q_1 - Q_1^2 + 60Q_2 - 60Q_1 - Q_2^2 + Q_1Q_2 - 30Q_2$$

$$= -Q_1^2 + 30Q_2 - Q_2^2 + Q_1Q_2$$

$$-2Q_1 + Q_2 = 0, 30 - 2Q_2 + Q_1 = 0 \Rightarrow Q_1 = 10, Q_2 = 20, P_1 = 50, P_2 = 40$$

$$\pi = 50 \times 10 + 40 \times 10 - 30 \times 20 = 300$$

(D) 採第二級差別取價時, 計算分割成三個價格區間, 求 CS, PS, TS, 無謂損失

$$\pi = (60 - Q_1)Q_1 + (60 - Q_2)(Q_2 - Q_1) + (60 - Q_3)(Q_3 - Q_2) - 30Q_3$$

$$= 60Q_1 - Q_1^2 + 60Q_2 - 60Q_1 - Q_2^2 + Q_1Q_2 + 60Q_3 - 60Q_2 - Q_3^2 + Q_2Q_3 - 30Q_3$$

$$= -Q_1^2 - Q_2^2 - Q_3^2 + Q_1Q_2 + Q_2Q_3 + 30Q_3$$

$$-2Q_1 + Q_2 = 0, -2Q_2 + Q_1 + Q_3 = 0, -2Q_3 + Q_2 + 30 = 0$$

$$\text{聯立求解 } Q_1 = 7.5, Q_2 = 15, Q_3 = 22.5 \quad P_1 = 52.5, P_2 = 45, P_3 = 37.5$$

$$\pi = 52.5 \times 7.5 + 45 \times 7.5 + 37.5 \times 7.5 - 30 \times 22.5$$

$$= 393.75 + 337.5 + 281.25 - 675$$

$$= 337.5$$