

習題 1

a.

$$\begin{aligned}
 60 - 2q &= 30 \Rightarrow q = 15 \Rightarrow P = 45 \\
 \Rightarrow \pi &= 45 \times 15 - 30 \times 15 = 225 = PS \\
 CS &= \frac{15 \times 15}{2} = 112.5, TS = 225 + 112.5 \\
 &= 337.5 \\
 DWL &= 112.5
 \end{aligned}$$

b.

$$\begin{aligned}
 60 - q &= 30 \Rightarrow q = 30 \Rightarrow \pi = \frac{30 \times 30}{2} = 450 \\
 CS &= 0, TS = 0 + 450 = 450, DWL = 0
 \end{aligned}$$

c.

$$\begin{aligned}
 \pi &= P(q_1)q_1 + P(q_2)(q_2 - q_1) - TC(q_2) \\
 &= (60 - q_1)q_1 + (60 - q_2)(q_2 - q_1) - 30q_2 \\
 &= -q_1^2 - q_2^2 + 30q_2 + q_1q_2 \\
 \text{一階條件為: } &-2q_1 + q_2 = 0, -2q_2 + 30 + q_1 = 0 \\
 \Rightarrow &q_1 = 10, q_2 = 20 \\
 \text{對應之價格: } &P_1 = 50, P_2 = 40 \\
 \Rightarrow \pi &= 50 \times 10 + 40 \times (20 - 10) - 30 \times 20 \\
 &= 300 \\
 CS &= \left( \frac{10 \times 10}{2} \right) + \left( \frac{10 \times 10}{2} \right) = 100 \\
 TS &= 100 + 300 = 400 \\
 DWL &= 450 - 400 = 50
 \end{aligned}$$

d.

$$\begin{aligned}\pi &= P(q_1)q_1 + P(q_2)(q_2 - q_1) + P(q_3)(q_3 - q_2) - TC(q_3) \\ &= (60 - q_1)q_1 + (60 - q_2)(q_2 - q_1) + (60 - q_3)(q_3 - q_2) - 30q_3 \\ &= -q_1^2 - q_2^2 - q_3^2 + 30q_3 + q_1q_2 + q_2q_3 \\ \text{— 留條件: } -2q_1 + q_2 &= 0, -2q_2 + q_1 + q_3 = 0 \\ \Rightarrow q_1 &= 7.5, q_2 = 15, q_3 = 22.5\end{aligned}$$