

# Week 15 翁瑞文

## 習題 1

(A)  $60 - 2q = 30 \Rightarrow q = 15 \Rightarrow p = 45 \Rightarrow TV = 45 \times 15 - 30 \times 15 = 225 = PS$

$CS = 15 \times 15 / 2 = 112.5$ ,  $TS = 225 + 112.5 = 337.5$ ,  $DWL = 112.5$ .

(B)  $60 - q = 30 \Rightarrow q = 30 \Rightarrow TV = 30 \times 30 / 2 = 450$   $CS = 0$ ,  $TS = 0 + 450 = 450$ ,  $DWL = 0$ .

(C)  $TV = P(q_1)q_1 + P(q_2)(q_2 - q_1) = TC(q_2) = (60 - q_1)(q_1 + (60 - q_2)(q_2 - q_1)) - 30q_2$   
 $= q_1^2 - q_2^2 + 30q_2 + q_1q_2$

- 一階條件為  $-2q_1 + q_2 = 0$   $-2q_2 + 30 + q_1 = 0 \Rightarrow$  聯立方程  $q_1 = 10$   $q_2 = 20$ .

對應價格為  $p_1 = 50$ ,  $p_2 = 40 \Rightarrow TV = 30 \times (0 + 40) + (20 + 0) - 30 \times 20 = 300$ .

$CS = (10 \times (0/2)) + (10 \times 10/2) = 100$   $TS = 100 + 300 = 400$   $DWL = 450 - 400 = 50$ .

(D)  $TV = P(q_1)q_1 + P(q_2)(q_2 - q_1) + P(q_3)(q_3 - q_2) - TC(q_3)$

$= (60 - q_1)q_1 + (60 - q_2)(q_2 - q_1) + (60 - q_3)(q_3 - q_2) - 30q_3$

$= -q_1^2 - q_2^2 - q_3^2 + 30q_3 + q_1q_2 + q_2q_3$

- 一階條件為  $-2q_1 + q_2 = 0$   $-2q_2 + q_1 + q_3 = 0$   $-2q_3 + 30 + q_2 = 0$

$\Rightarrow$  聯立方程  $q_1 = 7.5$   $q_2 = 15$   $q_3 = 22.5$ .

對應之價格為  $p_1 = 52.5$   $p_2 = 45$   $p_3 = 52.5$

$\Rightarrow TV = 52.5 \times 7.5 + 45 \times (15 - 7.5) + 52.5 \times (22.5 - 15) - 30 \times 22.5$   
 $= 337.5$ .

$CS = (7.5 \times 7.5 / 2) + (7.5 \times 7.5 / 2) + (7.5 \times 7.5 / 2) = 84.375$

$TS = 84.375 + 337.5 = 421.875$

$DWL = 450 - 421.875 = 28.125$ .