

1.

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

$$CS = 15 \times 15 \div 2 = 112.5, TS = 225 + 112.5 = 337.5$$

$$DWL = 112.5$$

$$(B) 60 - q = 30 \rightarrow q = 30, \pi = 30 \times 30 \div 2 = 450$$

$$CS = 0, TS = 0 + 450 = 450, DWL = 0$$

$$(C) \pi = P(q_1)q_1 + P(q_2)(q_2 - q_1) - TC(q_2) = (60 - q_1)q_1 +$$

$$(60 - q_2)(q_2 - q_1) - 30q_2 = -q_1^2 - q_2^2 + 30q_2 + q_1q_2$$

$$- \text{F.O.C. 条件} : -2q_1 + q_2 = 0, -2q_2 + 30 + q_2 = 0$$

$$\text{得 } q_1 = 10, q_2 = 20$$

$$\text{又求 price: } p_1 = 50, p_2 = 40 \rightarrow \pi = 50 \times 10 + 40(20 - 10) - 60 = 300$$

$$CS = (10 \times 10 / 2) + (10 \times 10 / 2) = 100, DWL = 450 - 400 = 50$$

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

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

$$- \text{F.O.C. 条件} : -2q_1 + q_2 = 0, -2q_2 + q_1 + q_3 = 0, q_1 = 7.5, q_2 = 15, q_3 = 22.5$$

$$\text{又求 price: } \pi = 52.5 \times 7.5 + 45 \times (15 - 7.5) + 37.5(22.5 - 15) = 337.5$$

$$CS = 84.375, TS = 84.375 + 337.5 = 421.875, DWL = 450 - 421.875 = 28.125$$