1.

2.

$\begin{cases} P = 100 - q_A \\ P = 80 - q_B \end{cases} \Rightarrow \begin{cases} q_A = 100 - P \\ q_B = 80 - P \end{cases}$

$Q = q_A + q_B = 180 - 2P$ 市場需求

$TV = TR - TC$

$= P(Q) \times Q - TC(Q)$

$= (90 - 0.5Q) \times Q - 20Q$

$\dfrac{d\pi}{dQ} = 0 \Rightarrow Q^* = 90 - Q - 20 = 70$

$P^* = 55 \quad Q^* = 70$

$TV^* = 55 \times 70 - 20 \times 70 = 2450$

$CS = CS_A + CS_B$

$CS_A = \frac{1}{2}(100 - 55) \times 45 = 1012.5$

$CS_B = \frac{1}{2}(80 - 55) \times 25 = 312.5$

$SW = PS + CS = 1325 + 2450 = 3775$

3.

$F = (80 - P) \times \dfrac{q}{2} = (80 - P)(8 - P)/2 = \dfrac{(80-P)^2}{2}$

$TV = 2F + (P - 20)(q_A + q_B) = (80 - P)^2 + (P - 20) \times (180 - 2P)$

$\pi = -P^2 + 60P + 2800$

由一階條件 $P = 30$, $F = 1250$, $q = 120$, $\pi = 3700$

$CS = CS_A(P=30) + CS_B(P=30) - 2F$

$= 2450 + 1250 - 2500 = 1200$

$TS = CS + PS = 1200 + 3700 = 4900$