3.

(A) $MR_A = MC$ · $100 - 2q_A = 20 \Rightarrow q_A = 40 \Rightarrow P_A = 60$

$MR_B = MC$ · $80 - 2q_B = 20 \Rightarrow q_B = 30 \Rightarrow P_B = 50$

$T_C = 60 \times 40 + 50 \times 30 - 20(40+30)$

$= 2500 = P_S$

$CS = CS_A + CS_B = 800 + 450 = 1250$

$TS = CS + PS = 3750$

(B) 先把需求水平增加(统一定价)

$$\begin{cases} P = 100 - q, & q \le 20 \\ P = 90 - 0.5q, & q \ge 20 \end{cases} \Rightarrow \begin{cases} MR_1 = 100 - 2q, & q \le 20 \\ MR_2 = 90 - q, & q \ge 20 \end{cases}$$

令 $MR_1 = MC \Rightarrow 100 - 2q = 20 \Rightarrow q = 40$ (不合)，再令 $MR_2 = MC$，$90 - q = 20 \Rightarrow q = 70$ (合) $\rightarrow P = 55$

$\pi_2 = 55 \times 70 - 20 \times 70 = 2450 = P_S$　$CS = CS_A + CS_B = 1012.5 + 512.5 = 1525$，$TS = 3775$

(C)

$F = (80 - P) \times \frac{q}{2} = (80 - P)(80 - P) \div 2 = (80 - P)^2 \div 2$

$\pi = 2F + (P - 20)(q_A + q_B) = (80 - P)^2 + (P - 20)(180 - 2P) = -P^2 + 60P + 2800$

由一阶件解 $\Rightarrow P = 30$，故 $F = 1250$，$q = 120$，$\pi = 3700$

$CS = CS_A(P=30) + CS_B(P=30) - 2F = 2450 + 1250 - 2500 = 1200$

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