3. (a). $MR_A = MC = 100 - 2q_A = 20. \Rightarrow q_A = 40, P_A = 60.$

$MR_B - MC = 80 - q_B = 20, \Rightarrow q_B = 30, P_B = 55,$

$TR = 60 \times 4 + 130 \times 50 - 2(4 - 130) = 7800 = PS$

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

$TS = CS + PS = 3750.$

(b). $\begin{cases} P = 100 - 2q, q \le 20, \\ P = 90 - 0.5q, q > 20, \end{cases} \Rightarrow \begin{cases} MR_1 = 100 - 4q, q \le 20. \\ MR_2 = 90 - q, q > 20, \end{cases}$

$MR_1 = MC \Rightarrow \begin{cases} q_1 = 40 \ (\text{不}\in) \\ q_2 = 70 \ (\in), P = 55, \end{cases}$

$TR = 55 \times 70 - 20 \times 70 = 2450 = PS$

$CS = CS_A + CS_B = 1225. \quad TS = 1225.$

(c). $Z = (80 - P) \times q = \frac{(80 - P)(80 - P)}{2}$

$\pi = -P^2 + 160P + 2800$

$\Rightarrow P = 30, F = 1250, q = 120, \pi = 3700$

$CS = 2450 - 1250 = 1200 = PS$

$TS = 1200 + 3700 = 4900.$