week 15

1. (A)

$60-2q=30 \Rightarrow q=15,\ P=45$ $CS=\frac{15\times 45}{2}=112.5$ $DWL=112.5$.

$\pi=45\times 15-30\times 15=225=PS$ $TS=225+112.5=337.5$

(B) $60-q=30 \Rightarrow q=30$ $CS=0$ $DWL=0$

$\pi=\frac{30\times 30}{2}=450$ $TS=0+450=450$

(C)

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

$=(100-q_1)q_1+(100-q_2)(q_2-q_1)-30q_2$

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

$f'=-2q_1+q_2=0,\ -2q_2+q_1q_2$

$\Rightarrow q_1=10,\ q_2=20$ $P_1=50$ $P_2=40$

$CS=\frac{60\times 20}{2}+\frac{40\times 20}{2}=1600$

$TS=1600+3000=4600$

$DWL=4500-4600=50$

$\pi=50\times 10+40(20-10)$

$-30\times 20=300$

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

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

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

$f'=-2q_1+q_2=0$ $-2q_2+q_1+q_3=0$ $-2q+30+q_2=0$

$\Rightarrow q_1=7.5$ $q_2=15$ $q_3=22.5$ $P_1=52.5$ $P_2=45$ $P_3=52.5$

$\pi=52.5\times 7.5+45(15-7.5)+37.5(22.5,13)-30\times 22.5=337.5$

$CS=\frac{7.5\times 7.5}{2}+\frac{7.5\times 7.5}{2}+\frac{7.5\times 7.5}{2}=84.375$

$TS=84.375+337.5=421.875$

$DWL=450-421.875=28.125$.