

COMM 220 – PRACTICE PROBLEM SET 4 SOLUTIONS

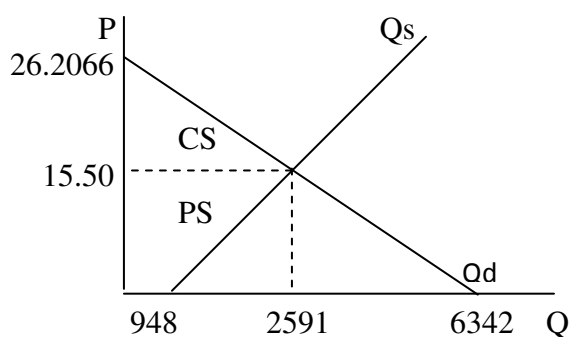
a. $Q_d = Q_s \Rightarrow P^* = (6342 - 948)/(242 + 106) = \mathbf{\$15.5}$ and $Q^* = 6342 - 242(15.5) = \mathbf{2591}$

b. For demand: $Q = 0, P = 6342/242 = 26.2066$; $P = 0, Q = 6342$

For supply: $P = 0, Q = 948$

$CS = (26.2066 - 15.5)(2591)/2 = \mathbf{\$13870.4153}$

$PS = (948 + 2591)(15.5)/2 = \mathbf{\$27427.25}$



c. $P = 12, Q_d = 6342 - 242(12) = 3438$ and $Q_s = 948 + 106(12) = 2220$

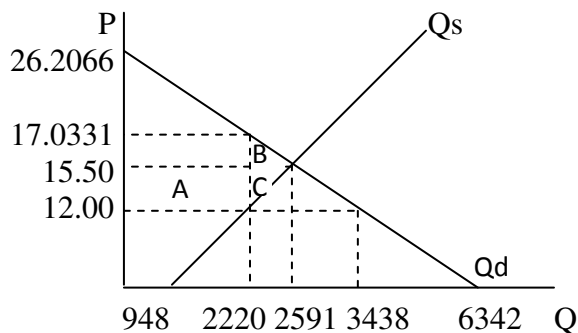
$Q_d > Q_s \Rightarrow \mathbf{Shortage = 3438 - 2220 = 1218}$

$Q_d = 2220, P = (6342 - 2220)/242 = 17.0331$

$\Delta CS = A - B = (15.5 - 12)(2220) - (17.0331 - 15.5)(2591 - 2220)/2 = \mathbf{\$7485.61}$

$\Delta PS = -A - C = -(15.5 - 12)(2220) - (15.5 - 12)(2591 - 2220)/2 = \mathbf{-\$8419.25}$

$DW \text{ loss} = \Delta CS + \Delta PS = -B - C = \mathbf{-\$933.64}$



d. $P = 18$, $Q_d = 6342 - 242(18) = 1986$ and $Q_s = 948 + 106(18) = 2856$

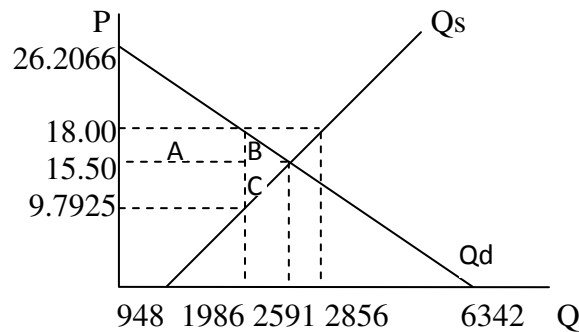
$Q_s > Q_d \Rightarrow \text{Surplus} = 2856 - 1986 = \mathbf{870}$

$Q_s = 1986$, $P = (1986 - 948)/106 = 9.7925$

$\Delta CS = -A - B = -(18 - 15.5)(1986) - (18 - 15.5)(2591 - 1986)/2 = -\5721.25

$\Delta PS = A - C = (18 - 15.5)(1986) - (15.5 - 9.7925)(2591 - 1986)/2 = \3238.48

DW loss = $\Delta CS + \Delta PS = -B - C = -\2482.77



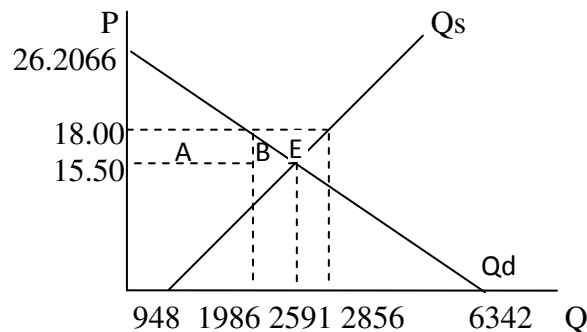
e. $P = 18$, Surplus = 870, Government cost = $870(18) = \mathbf{\$15660}$

$\Delta CS = -A - B = -(18 - 15.5)(1986) - (18 - 15.5)(2591 - 1986)/2 = -\5721.25

$\Delta PS = A + B + E$

$= (18 - 15.5)(1986) + (18 - 15.5)(2591 - 1986)/2 + (18 - 15.5)(2856 - 1986)/2 = \mathbf{\$6808.75}$

DW loss = $\Delta CS + \Delta PS - \text{Government cost} = -\14572.50



f. $\text{Tax} = 2, P_b - P_s = 2$

$$Q_d = Q_s \Rightarrow 6342 - 242P_b = 948 + 106P_s \Rightarrow 6342 - 242(P_s + 2) = 948 + 106P_s$$

$$P_s = (6342 - 484 - 948)/(242 + 106) = \mathbf{\$14.1092} \text{ and } P_b = 14.1092 + 2 = \mathbf{\$16.1092}$$

$$Q = 6342 - 242(16.1092) = \mathbf{2443.5747}$$

$$\% \text{ of tax paid by buyers} = (16.1092 - 15.5)/2 = \mathbf{30.46\%}$$

$$\% \text{ of tax paid by sellers} = (15.5 - 14.1092)/2 = \mathbf{69.54\%}$$

$$\Delta CS = -A - B$$

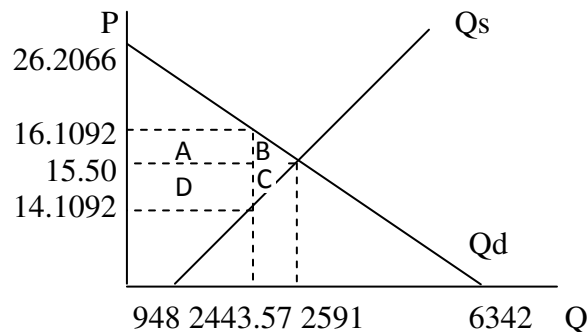
$$= - (16.1092 - 15.5)(2443.5747) - (16.1092 - 15.5)(2591 - 2443.5747)/2 = - \mathbf{\$1533.53}$$

$$\Delta PS = -D - C$$

$$= - (15.5 - 14.1092)(2443.5747) - (15.5 - 14.1092)(2591 - 2443.5747)/2 = - \mathbf{\$3501.04}$$

$$\text{Government tax revenue} = A + D = 2(2443.5747) = \mathbf{\$4887.15}$$

$$\text{DW loss} = \Delta CS + \Delta PS + \text{Government tax revenue} = -B - C = - \mathbf{\$147.42}$$



g. $\text{Subsidy} = 2, P_s - P_b = 2$

$$Q_d = Q_s \Rightarrow 6342 - 242P_b = 948 + 106P_s \Rightarrow 6342 - 242(P_s - 2) = 948 + 106P_s$$

$$P_s = (6342 + 484 - 948)/(242 + 106) = \mathbf{\$16.8908} \text{ and } P_b = 16.8908 - 2 = \mathbf{\$14.8908}$$

$$Q = 6342 - 242(14.8908) = \mathbf{2738.4253}$$

$$\% \text{ of subsidy accrued to buyers} = (15.5 - 14.8908)/2 = \mathbf{30.46\%}$$

$$\% \text{ of subsidy accrued to sellers} = (16.8909 - 15.5)/2 = \mathbf{69.54\%}$$

$$\Delta CS = C + D = (15.5 - 14.8908)(2591 + 2738.4253)/2 = \mathbf{\$1623.34}$$

$$\Delta PS = A + B = (16.8908 - 15.5)(2738.4253 + 2591)/2 = \mathbf{\$3706.08}$$

$$\text{Government cost} = A + B + C + D + F = 2(2738.4253) = \mathbf{\$5476.85}$$

$$\text{DW loss} = \Delta\text{CS} + \Delta\text{PS} - \text{Government cost} = -F = \mathbf{-\$147.43}$$

