COMM 220 – PRACTICE PROBLEM SET 1 SOLUTIONS

1. (a) Use the CPI of Vancouver as the base:
   Price in Vancouver = $300,000
   Price in Toronto = $290,000*(143.2 / 135.8) = $305,802.65
   Price in Montreal = $280,000*(143.2 / 126.5) = $316,964.43

   Or, use the CPI of Toronto as the base:
   Price in Vancouver = $300,000*(135.8 / 143.2) = $284,497.21
   Price in Toronto = $290,000
   Price in Montreal = $280,000*(135.8 / 126.5) = $300,584.98

   Or, use the CPI of Montreal as the base:
   Price in Vancouver = $300,000*(126.5 / 143.2) = $265,013.97
   Price in Toronto = $290,000*(126.5 / 135.8) = $270,139.91
   Price in Montreal = $280,000

   Or, use 100 as the common base for all cities:
   Price in Vancouver = $300,000*(100 / 143.2) = $209,497.21
   Price in Toronto = $290,000*(100 / 135.8) = $213,549.34
   Price in Montreal = $280,000*(100 / 126.5) = $221,343.87

   Montreal has the highest real price of apartment unit while Vancouver has the lowest.

   (b) Let the CPI for 2000 equals 100 and the CPI for 2006 equals 115, which reflects a 15% increase in the overall price level. To find the real price of long-distance telephone service in each period, divide the nominal price by the CPI for that year.

   For 2000, we have 25/100 or 25 cents, and for 2006, we have 10/115 or 8.6957 cents. The real price therefore fell from 25 cents to 8.6957 cents.

   % change in the real price of long-distance telephone service from 2000 to 2006
   = (8.6957 – 25) / 25 = –65.2172%

   (c) Use Paul's graduation year as the base year:
   John's salary in real dollars = $36,000*(115/100) = $41,400 > Paul's salary of $40,000

   Or, use John's graduation year as the base year:
   Paul's salary in real dollars = $40,000*(100/115) = $34,782.6087 < John's salary of $36,000

   No, Paul actually has the lower salary in real dollars.

2. (a) Set $Q_D = Q_S$ to find the equilibrium price and quantity:
   880 – 70P = 240 + 90P
   P = (880 – 240) / (90 + 70) = $4 per bushel
   Substitute P = $4 into Q_D to find Q:
   Q = 880 – 70(4) = 600 million bushels

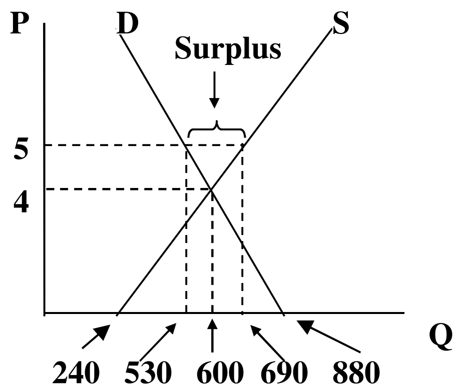
Or, substitute P = \$4 into Q_S to find Q:
$Q_S = 240 + 90(4) = 600$ million bushels

(b) The price elasticity of supply, $\mathbf{E_P^S = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = (90)\left(\frac{4}{600}\right) = 0.60}$

The price elasticity of demand, $\mathbf{E_P^D = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = (-70)\left(\frac{4}{600}\right) = -0.4667}$

(c) At P = \$5.00, $Q_S = 240 + 90(5) = 690$ million bushels
$Q_D = 880 – 70(5) = 530$ million bushels
Surplus = $Q_S – Q_D = 690 – 530 = 160$ million bushels
Yes, the government will be forced to purchase 160 million bushels of wheat.
The government will have to pay \$800 million (\$5.00 x 160).

(d)



3. (a) Total demand for wheat, $Q_{TD} = Q_{DD} + Q_{ED} = (960 – 80P) + (1380 – 70P) = 2340 – 150P$
Set $Q_{TD} = Q_S$ to find the free market price and quantity:
$2340 – 150P = 855 + 180P$
$P = (2340 – 855)/(150 + 180) = 1485/330 = \$4.50$ per bushel
Substitute P=\$4.5 into Q_{TD} to find Q:
$Q = 2340 – 150(4.5) = 1665$ million bushels
Or, substitute P=\$4.5 into Q_S to find Q:
$Q = 855 + 180(4.5) = 1665$ million bushels

(b) New Q_{ED} after the 25% drop = $0.75(1380 – 70P) = 1035 – 52.5P$
New $Q_{TD} = (960 – 80P) + (1035 – 52.5P) = 1995 – 132.5P$
New $P = (1995 – 855)/(132.5 + 180) = 1140/312.5 = \$3.648$ per bushel.
25% drop in export demand will cause the wheat price to fall by 18.9333% (3.648/4.5 – 1).

(c) P=\$4.80, $Q_S = 855 + 180(4.80) = 1719$ and $Q_{TD} = 1995 – 132.5(4.80) = 1359$
Surplus = Government purchase = 1719 – 1359 = 360 million bushels
Government cost = \$4.80(360) = \$1728 million

4. (a) Given P = \$40 and Q = 1280,

$$\mathbf{E_P^S = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = d\left(\frac{40}{1280}\right) = 0.8 \Rightarrow d = 25.6}$$

Substitute P = 40, Q = 1280, and d = 25.6 into $Q_S = c + dP$,

$c = Q - dP = 1280 - 25.6(40) = 256$

So, $Q_S = 256 + 25.6P$

Given P = \$40 and Q = 1280,

$$\mathbf{E_P^D = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right) = -b\left(\frac{40}{1280}\right) = -0.64 \Rightarrow b = 20.48}$$

Substitute P = 40, Q = 1280, and b = 20.48 into $Q_D = a - bP$,

$a = Q + bP = 1280 + 20.48(40) = 2099.2$

So, $Q_D = 2099.2 - 20.48P$

(b) To find the new demand curve with a 20% increase,

$Q_D' = 1.2Q_D = (1.2)*(2099.2 - 20.48P) = 2519.04 - 24.576P$

To find the new supply curve with a 10% decrease,

$Q_S' = 0.9Q_S = (0.9)*(256 + 25.6P) = 230.4 + 23.04P$

Equate Q_D' with Q_S' to find the new equilibrium price and quantity,

$2519.04 - 24.576P = 230.4 + 23.04P$

$P = (2519.04 - 230.4) / (23.04 + 24.576) = \$48.0645$ per ton

Substitute P = 48.0645 into Q_S' to find Q,

$Q = 230.04 + 23.04(48.0645) = 1337.8065$ tons

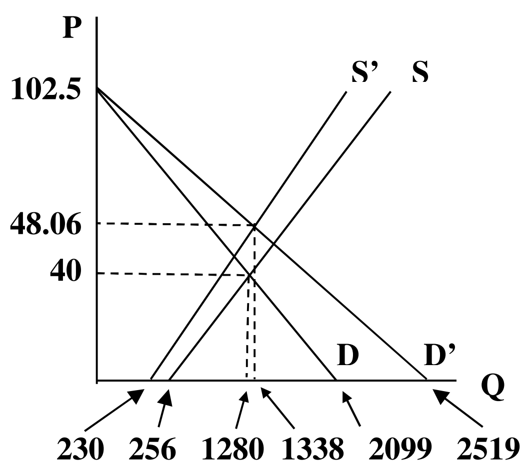
Or, substitute P = \$48.0645 into Q_D' to find Q:

$Q = 2519.04 - 24.576(48.0645) = 1337.8065$ tons

(c) Percentage change in price = (48.0645 – 40) / 40 = 20.16%

Percentage change in quantity = (1337.8065 – 1280) / 1280 = 4.516%

(d)



5. (a)

$$\mathbf{E}_P^D = \left(\frac{\mathbf{\Delta Q}}{\mathbf{\Delta P}}\right)\left(\frac{\mathbf{P}}{\mathbf{Q}}\right) = \frac{\mathbf{30}}{\mathbf{18000}}\left(\frac{\mathbf{20000-18000}}{\mathbf{24-30}}\right) = \frac{\mathbf{30}}{\mathbf{18000}}\left(\frac{\mathbf{-2000}}{\mathbf{6}}\right) = \mathbf{-.5556}$$

$$\mathbf{E}_P^D = \left(\frac{\mathbf{\Delta Q}}{\mathbf{\Delta P}}\right)\left(\frac{\mathbf{P}}{\mathbf{Q}}\right) = \frac{\mathbf{24}}{\mathbf{20000}}\left(\frac{\mathbf{-2000}}{\mathbf{6}}\right) = \mathbf{-0.4}$$

(b) $$\mathbf{E}_P^D = \left(\frac{\Delta \mathbf{Q}}{\Delta \mathbf{P}}\right)\left(\frac{\overline{\mathbf{P}}}{\overline{\mathbf{Q}}}\right) = \frac{\mathbf{(24+30)/2}}{\mathbf{(18000+20000)/2}}\left(\frac{\mathbf{-2000}}{\mathbf{6}}\right) = \mathbf{-0.4737}$$

(c) $Q_D = a + bP$
$a = Q_D - bP = 18{,}000 - (-2{,}000 / 6)(30) = 28{,}000$
Or, $a = 20{,}000 - (-2{,}000 / 6)(24) = 28{,}000$

$Q_D = 28{,}000 - (2000/6)P = 28{,}000 - 333.3333P$

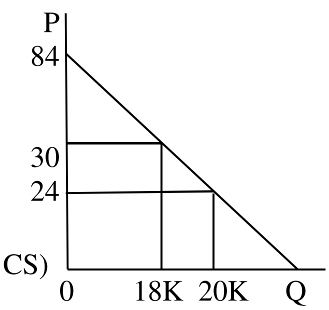
(d) Revenue (P=30) = 30 × 18,000 = \$540,000
At P = \$36, $Q_D = 28{,}000 - 333.3333(36) = 16{,}000$
Revenue (P=36) = 36 x 16,000 = \$576,000
Revenue goes up by \$36,000 (i.e., +6.67%) when price is increased by 20%

(e) When demand is price inelastic, increase in price will increase total revenue.

(f) P=\$30, Q_D = 18,000
Q_D=0, P = 28000*6/2000 = \$84
CS(P=30) = 18000*(84 – 30)/2 = \$486,000

P=\$24, Q_D = 20,000
CS(P=24) = 20000*(84 – 24)/2 = \$600,000

Change in CS = 600,000 – 486,000 = \$114,000 (an increase in CS)



Or, Change in CS = (30 – 24)(18000 + 20000)/2 = \$114,000

6. (a) Price after the 10% drop = 12*0.9 = \$10.8
% change in Q_D when price drops by 10% = (–1.5)*(–0.10) = +15%
Q_D after the price decrease = 1.15*25000 = 28,750
Change in CS = (12 – 10.8)(28750 + 25000)/2 = \$32,250 (an increase in CS)

(b) Price after the 10% rise = 12*1.1 = \$13.2
% change in Q_D when price rises by 10% = (–1.5)*(0.10) = –15%
Q_D after the price increase = 0.85*25000 = 21,250
Change in CS = (12 – 13.2)(25000 + 21250)/2 = –\$27,750 (a decrease in CS)