Assignment 2
Solutions

Problem 1

John's daily demand for milk is given by $P = 20 - Q_J$ where Q is pints of milk and P is the price he is willing to pay for each pint. Mary's daily demand for milk is given by $P = 15 - Q_M$. Mary has a cow that yields 15 pints of milk per day.

(a) How many pints of milk will John buy from Mary and at what price?

One way is to use the box with marginal values. In the equilibrium it must be that $MV_J = MV_M$, the MVs are equalized and also the total quantity of milk that John and Mary consume is equal to 15. This gives us two equations:
$20 - Q_J = 15 - Q_M$ and $Q_J + Q_M = 15$, which solves for $Q_J = 10$. Then the market price must be $P = 20 - 10 = 10$.

Alternatively you can use the aggregate demand: $Q^D = Q_M + Q_J$. Solve individual demands for $Q_M = 15 - P$ and $Q_J = 20 - P$, plug into the market demand $Q^D = 35 - 2P$. Then the market demand is represented by John's demand for any price above 15 and the summation of both consumer's demands for prices below 15.

In equilibrium market Q demanded must be equal to market quantity supplied $Q^S = 15$: $35 - 2P = 15$, P=10. Equilibrium price is 10 and at this price John buys 10 eggs from Mary; Mary demands and therefore keeps 5 of her eggs.

(b) Calculate consumer's and seller's surplus, and the total gains from trade, show the respective areas on the diagram.

$CS = \frac{1}{2}(20 - 10) \cdot 10$; $SS = \frac{1}{2}(10 - 0) \cdot 10$

(c) Suppose Mary got another cow for her birthday. What will happen to the market equilibrium price? Show on a diagram similar to Fig. 6-8 on p. 127; you do not need to calculate the market demand and the new price, but you have to **explain** what will force the equilibrium price to change and in which direction.

After Mary acquires an additional cow the market is not in equilibrium any more: with two cows there is a surplus at price equal to 10. In order to bring market to the new equilibrium the price must decrease. Also as Mary gets the new cow the MVs are not equalized any more: $MV_M < MV_J$, Mary has relatively 'too much milk', therefore Mary will be willing to lower the price of milk so as to exploit potential gains from selling more milk to John.