# Exam #3 *QM* Answer Key

1. (a) Demand increases. Equilibrium price up, equilibrium quantity up.

   (b) Supply decreases. Equilibrium price up, equilibrium quantity down.

   (c) Supply increases. Equilibrium price down, equilibrium quantity up.

2. The amount that buyers want to buy at the market equilibrium price is equal to the amount that sellers want to sell at that price. At a lower price, buyers want to buy more units than sellers want to sell; this creates incentives that push the price up towards equilibrium. At a higher price, sellers want to sell more units than buyers want to buy; this creates incentives that push the price down towards equilibrium.

3. (a) During bad years the supply decreases (i.e., shifts to the left), so point X is the equilibrium during bad years.

   (b) Total revenue is $p \cdot q$. At point X this is $4 \cdot 1.20 = \$4.8$ million per day. At point Y this is $8 \cdot .80 = \$6.4$ million per day. At point Z this is $14 \cdot .20 = \$2.8$ million per day.

   (c) Profits are higher during "bad" years! During "good" years there is a Prisoner's Dilemma–type situation for orange growers: they'd make more money if they reduced their harvest (thereby driving up the equilibrium price), but the individual incentives are such that they all produce a lot.

4. (a) See figure.

P ($/pound)

Q (millions of pounds per day)
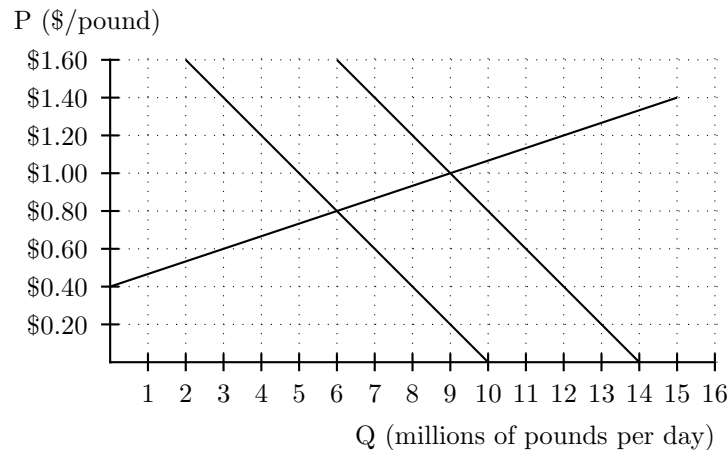
   (b) At a price of, say, $.80, buyers actually have to pay $1.60 after tax, so with a market price of $.80 and an $.80 tax they should be willing to buy as much as they were willing to buy at a price of $1.60 without

the tax. Similarly, with a market price of $.40 and a $.80 tax they should be willing to buy as much as they were willing to buy at a price of $1.20 without the tax. Or: The marginal benefit curve shifts down by $.80 because of the tax.

(c) The new equilibrium price is $.80 per pound. Since sellers received $1.00 per pound originally, they are getting $.20 less than before. Buyers used to pay $1.00 per pound; now they pay $.80, but they pay an additional $.80 in taxes, so they effectively pay $1.60 per pound. This is $.60 more than before.

The ratio of the tax burdens is $\dfrac{T_B}{T_S} = \dfrac{.6}{.2} = 3$.

(d) The price elasticity of supply is $\frac{5}{3} \approx 1.66$; the price elasticity of demand is $\frac{-5}{9} \approx -.556$. Their ratio is -3, which is of the same magnitude as the ratio of the tax burdens!

5. It wouldn't change at all. This is the *tax equivalence* result.

6.