Exam #3 (100 Points Total) **Answer Key**

1. For each item, indicate the likely impact on the supply and demand for apples. Then indicate the effect on the equilibrium price and quantity. It may help to use a graph.

   (a) (5 points) News reports suggest that an apple a day really does keep the doctor away.

   Demand increases. Equilibrium price up, equilibrium quantity up.

   (b) (5 points) Worms destroy a large part of the apple crop.

   Supply decreases. Equilibrium price up, equilibrium quantity down.

   (c) (5 points) New farming methods make apple orchards more productive.

   Supply increases. Equilibrium price down, equilibrium quantity up.

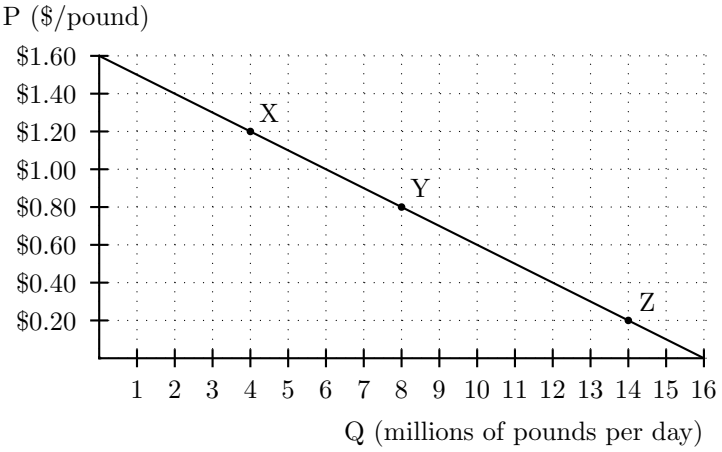
   (d) (5 points) The price of oranges falls. (Assume that apples and oranges are **substitutes**, like tea and coffee or Coke and Pepsi.)

   Demand decreases. Equilibrium price down, equilibrium quantity down.

2. **(10 points)** Explain, as if to a non-economist, why the intersection of the market supply curve and the market demand curve identifies the market equilibrium.

   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. Below is a hypothetical demand curve for oranges.



(a) (5 points) During normal years, the supply curve is such that point Y is the equilibrium. Of the other two points, one is the equilibrium during "bad" years (when frost damages the orange crop), and one is the equilibrium during "good" years (when the orange crop thrives). Which one is point X? Circle one: X = bad good

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

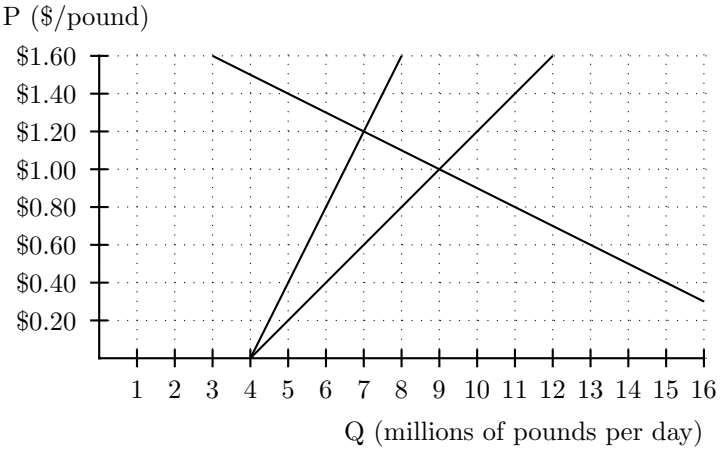
(b) (5 points) What is the total revenue at points X, Y, and Z? (Use correct units!)

Total revenue is pq. 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) (5 points) The orange growers' profit is total revenue minus total costs. If total costs are the same in all years, do the growers have higher profits in "bad" years or "good" years? (Circle one.)

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. Below is a hypothetical market for oranges.



Suppose that the government decides to impose a sales tax of 50% on the sellers of oranges. (With a sales tax, if sellers sell a pound of oranges for $1, they get to keep $.50 and have to pay the government $.50; if they sell a pound of oranges for $2, they get to keep $1 and have to pay the government $1.)

(a) (5 points) Show the impact of this tax on the supply and demand curves above.

(b) (5 points) Explain (as if to a non-economist) why the tax shifts the curves the way it does.

At a price of, say, $.80, sellers actually get to keep $.40 after-tax, so with a market price of $.80 and a 50% tax they should be willing to supply as much as they were willing to supply at a price of $.40 without the tax. Similarly, with a market price of $1.20 and a 50% tax they should be willing to supply as much as they were willing to supply at a price of $.60 without the tax.

(c) (5 points) Calculate the economic incidence of the tax, i.e., the amount of the tax burden borne by the buyers (T_B) and the amount borne by the sellers (T_S). Then calculate their ratio $\frac{T_B}{T_S}$.

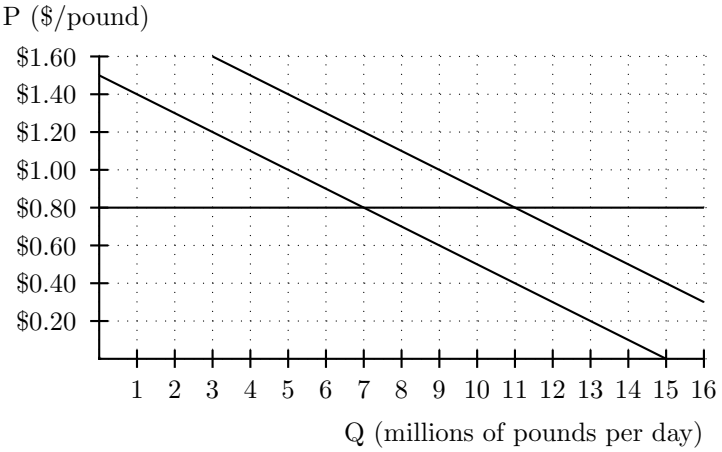
The new equilibrium price is $1.20 per pound. Since buyers paid $1.00 per pound originally, they are paying $.20 more than before. Sellers used to receive $1.00 per pound; now they receive $1.20, but they pay 50% in taxes, so they effectively receive $.60 per pound. This is $.40 less than before.

The ratio of the tax burdens is $\frac{T_B}{T_S} = \frac{.2}{.4} = \frac{1}{2}$.

(d) (5 points) Calculate the price elasticity of supply, ε_S, at the original (pre-tax) equilibrium. Then calculate the price elasticity of demand, ε_D, at the original (pre-tax) equilibrium. Then calculate their ratio, $\frac{\varepsilon_S}{\varepsilon_D}$. How does this ratio compare to the ratio of the tax burdens?

The price elasticity of supply is about .556; the price elasticity of demand is about -1.111. Their ratio is $-\frac{1}{2}$, which is of the same magnitude as the ratio of the tax burdens!

5. Below is a hypothetical market for oranges.



Suppose that the government decides to impose a per-unit tax of $.40 per pound on the buyers of oranges.

(a) (5 points) Show the impact of this tax on the supply and demand curves above.

(b) (5 points) Explain (as if to a non-economist) why the tax shifts the curves the way it does.

At a market price of, say, $1.00, buyers have to pay an extra $.40 in tax, so they are effectively paying $1.40 per pound. So they should be willing to buy at a market price of $1.00 with the tax as much as they were willing to buy at a market price of $1.40 without the tax.

Another approach: the marginal benefit curve shifts down by $.40 because the marginal benefit of each unit is reduced by that amount by the tax.

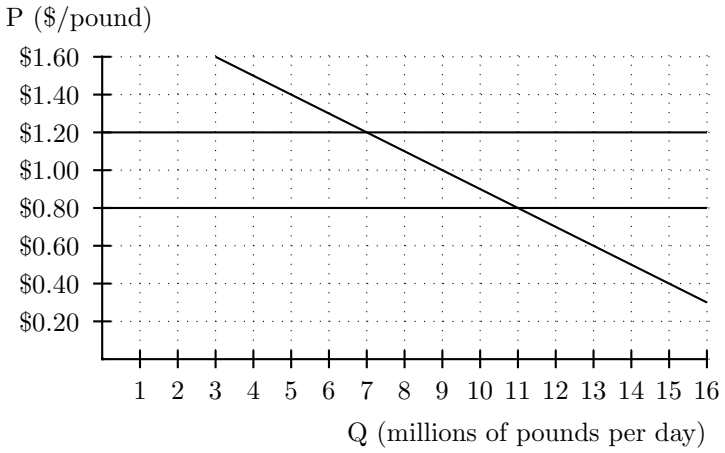
(c) (5 points) Calculate the economic incidence of the tax, i.e., the amount of the tax burden borne by the buyers (T_B) and the amount borne by the sellers (T_S).

The original equilibrium price, $.80 per pound, is the same as the original equilibrium price. So the sellers receive the same amount

per pound both before and after the tax; hence, they bear none of the economic burden of the tax. The buyers must therefore pay all of it: they paid \$.80 per pound before the tax, and now pay \$.80 per pound to the sellers plus \$.40 per pound to the government, for a total of \$1.20 per pound. So the buyers bear the entire \$.40 tax burden.

(d) (5 points) How would the economic incidence of the tax change if the \$.40 per-unit tax was placed on the sellers instead of on the buyers? Use the graph below to analyze this situation, and briefly explain your answer.

The economic incidence of the tax would not change; this is the tax equivalence result. Ultimately, the incidence of the tax is determined by the relative elasticities of the supply and demand curves; the party that bears the brunt of the economic incidence of the tax is that party that is least able to avoid the tax, i.e., the party with the most inelastic curve. Since the supply curve in this problem is perfectly elastic, the buyer will bear the entire economic tax burden, regardless of whether the legal tax burden falls on the buyers or the sellers.



6. (5 points) *Short-run* supply curves for many goods (e.g., apartments in Seattle) are often depicted as being perfectly inelastic. Explain, as if to a noneconomist, why this makes sense. Also, draw a perfectly inelastic supply curve. (Make sure to label your axes.)

   A perfectly inelastic supply curve means that sellers are totally unresponsive to price changes: increases or decreases in the market price have no effect on the amount that they want to sell. (Graphically, the supply curve is a vertical line.) This makes sense for some short-run supply curves because supply is fixed in the short run, meaning that sellers have no choice but to sell at whatever the market rate happens to be. In the market for apartments, for example, sellers of apartments cannot—*in the short run*—build new apartments or take apartments off the market; all they can do is rent the apartments at the going (market) rate.

7. (5 points) *Long-run* supply curves for many goods (e.g., nails) are often depicted as being perfectly elastic at some price p^*. Explain, as if to a noneconomist, why this makes sense. Also, draw a perfectly elastic supply curve. (Make sure to label your axes.)

   A perfectly elastic supply curve means that sellers are infinitely responsive to price changes: at any price lower than p^* they exit the market and are unwilling to sell even a single unit; at any price higher than p^*, they flood the market and are willing to sell an infinite number of units. (Graphically, the supply curve is a horizontal line at p^*.) This makes sense for some long-run supply curves because p^* is the price at which suppliers get the market rate of return, i.e., a rate of return equal to what they could get by investing elsewhere in the economy. At prices below p^*, investing in a nail factory yields a lower-than-market rate of return, so in the long run suppliers will all exit the industry. At prices above $p*$, investing in a nail factory yields a higher-than-market rate of return, so in the long run suppliers will all want to enter the market. At the price p^*, potential investors are indifferent between investing in nail factories or investing elsewhere in the economy. Graphically, this indifference is manifested in a supply curve that is horizontal at price p^*: sellers are willing to sell any amount at that price.