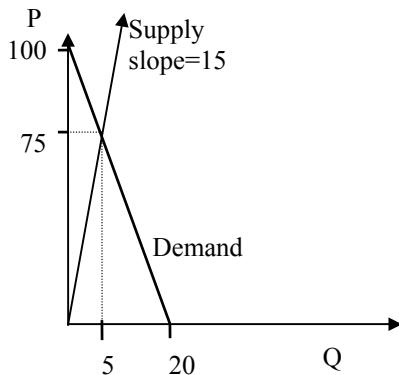
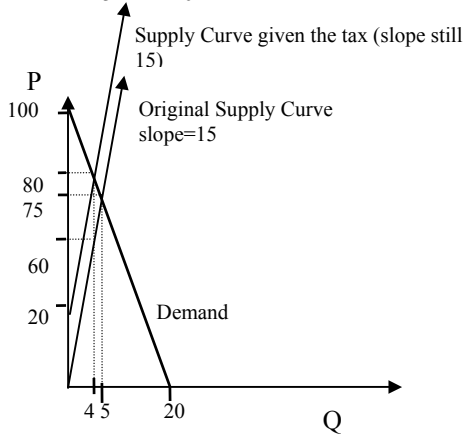


Problem Set #3 Answers Economics 2106H, John L. Turner

1. (a)



(b) Equilibrium: $Q^*=5, P^*=75$



(d) New equilibrium: $Q^*=4, P^*=80$

(e) No, because the tax is paid for by both consumers and producers – not just consumers!

(f) Tax Revenue = $20 \times 4 = 80$

(g) Producers' share = $(75-60)4=60$ (i.e., 75%)

Consumers' share = $(80-75)4=20$ (i.e., 75%)

(h) & (i) Consumer Surplus:

Before the tax: $5(100-75)/2 = 125/2 = 62.5$

After the tax: $4(100-80)/2 = 40$

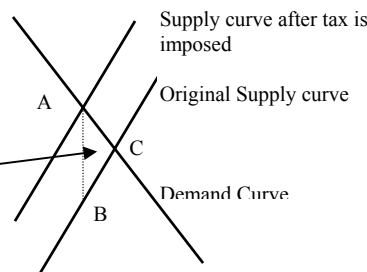
Producer Surplus:

Before the tax: $75 \times 5 / 2 = 375/2 = 187.5$

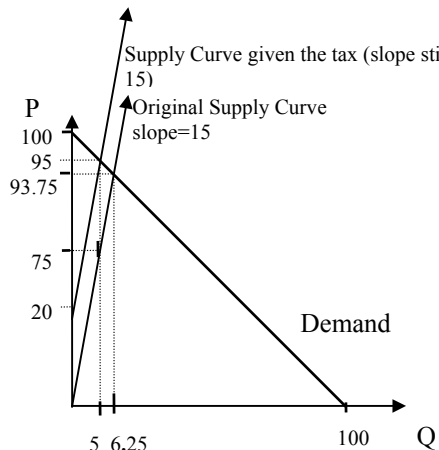
After the tax: $4(80-20)/2 = 120$

(j) The deadweight loss = $(80-60)(5-4)/2 = 10$:

Dead weight loss is area of triangle ABC = 10



2. (a)



Equilibrium (before the tax): $Q^*=6.25, P^*=93.75$

Equilibrium (after the tax): $Q^*=5, P^*=95$

(b) Consumer Surplus:

Before the tax: $6.25(100-93.75)/2 = 19.53125$

After the tax: $5(100-95)/2 = 12.5$

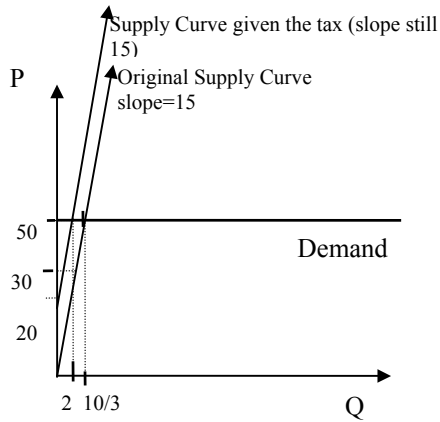
Producer Surplus:

Before the tax: $93.75 \times 6.25/2 = 292.96875$

After the tax: $5(95-20)/2 = 187.5$

(c) The deadweight loss = $(95-75)(6.25-5)/2 = 12.5$

3. (a)



Equilibrium (before the tax): $Q^*=4/3, P^*=50$

Equilibrium (after the tax): $Q^*=2, P^*=50$

(b) Consumer Surplus:

Before the tax: 0

After the tax: 0

Producer Surplus:

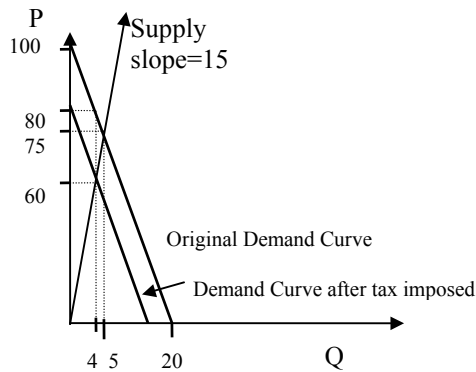
Before the tax: $50(4/3)(1/2) = 83 \frac{1}{3}$

After the tax: $2(50-20)/2 = 30$

(c) The deadweight loss = $(50-30)((10/3)-2)/2 = 40/3$

(d) In this instance, the tax burden is borne entirely by the producers (this is seen clearly in part b of this question, where the producer surplus declines after the tax, but the consumer surplus is unaffected by it). This extreme case is an artifact of the demand curve. The horizontal demand curve indicates that individuals are not willing to pay any greater price than $p=50$, no matter what quantity is produced. Because this is the case, the producer cannot raise the price he charges consumers. If he did, *no one* would buy the product. This is in contrast to the situation, say, in problem #1, where there is a tradeoff as to who is burdened by the tax (both CS and PS go down to some extent). When the demand curve is horizontal like this, the situation is what economists call one of *perfect elasticity* of demand. The opposite case would be that of vertical demand. Were this to be the case, the entire burden of the tax would be borne by the consumers. This case is known as *perfect inelasticity* of demand.

4. (a)

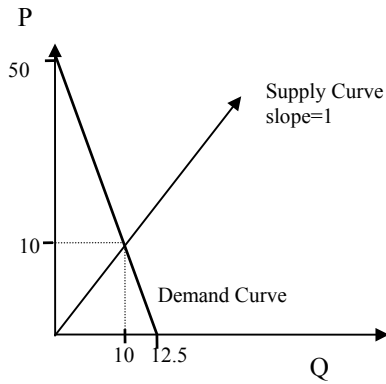


(b) Equilibrium: $Q^*=4, P^*=60$ (note: total cost to consumer is $80 = 60 + \text{tax of } 20$)

(c) - (f) Same answers as question (1)

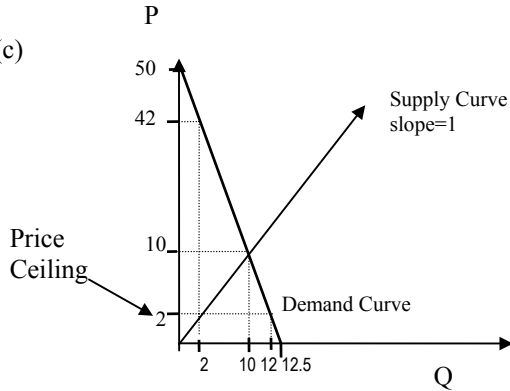
(g) The effect of a tax is independent of whether it is imposed on producers or consumers

5. (a)



(b) Equilibrium: $Q^*=10, P^*=10$

(c)



(d) Quantity demanded of 12 exceeds the quantity supplied of 2. Therefore, there is a shortage of 10 pizzas. The market is not in equilibrium, but the price is \$2 and 2 pizzas are sold.

(e) Consumer Surplus = $10(50-10)/2 = 200$

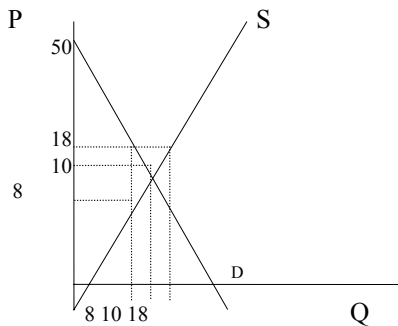
Producer Surplus = $10 \times 10 / 2 = 50$

(f) Consumer Surplus = $2(42-2) + 2(50-42)/2 = 88$

Producer Surplus = $2 \times 2 / 2 = 2$

(g) Deadweight Loss = $((10-2)(10-2)/2) + (42-10)(10-2)/2 = 160$

h)

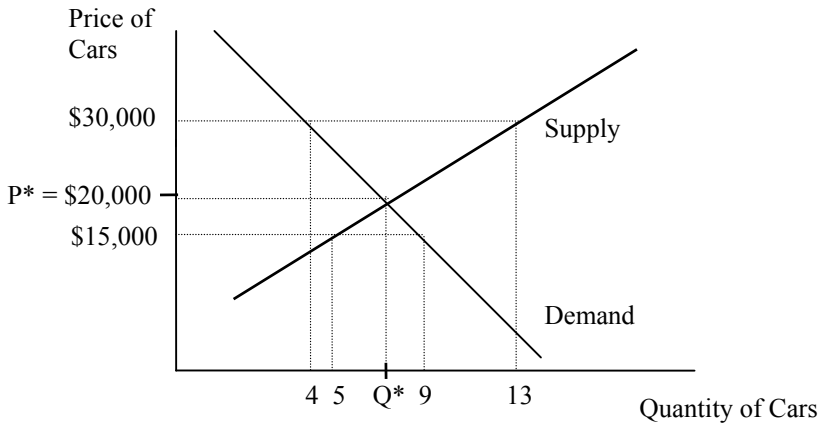


(Note figure not drawn to scale, should match above)

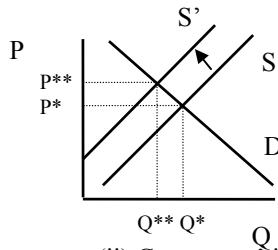
The quantity supplied is 18, and this exceeds the quantity demanded, which is 8. Therefore, there is a surplus of 10 pizzas. Again, the market is not in equilibrium, but the price is \$18, and 8 pizzas are sold.

i) $PS=(18-8)8 + 8(8)/2=112$ $CS=(50-18)8/2=128$

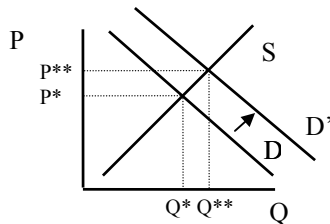
6.



- (a) See above.
- (b) The quantity demanded of any good is inversely related to the price of that good. Therefore, the demand curve for a good (which represents the quantity demanded for a given price of the good) is not upward sloping.
- (c) A change in demand is represented by a shift in the demand curve, while a change in quantity demanded is a movement along a demand curve.
- (d) The quantity supplied exceeds the quantity demanded by 9 cars.
- (e) The quantity supplied equals the quantity demanded and therefore, the market is in equilibrium.
- (f) The quantity demanded exceeds the quantity supplied by 4 cars.
- (g) The supply curve shows the quantity of goods that firms are willing to supply to the market at different prices
- (h) The market supply curve is the total (i.e., horizontal summation of) all firms' supply curves in that market. The market demand curve is the total (i.e., horizontal summation of) all individuals' demand curves for that good.
- (i) Show graphically how each of the following affects the price and quantity of cars sold:
 - (i) Price of steel increases: Therefore, supply of cars decreases, and thus the equilibrium price of cars increases and quantity decreases.

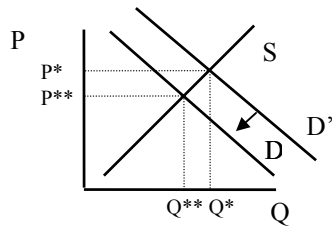


- (ii) Consumers' income increases: Therefore, demand for cars increases, and thus the equilibrium price of cars increases and quantity increases.



- (iii) Same as (ii)

(iv) Price of gasoline increases: Therefore, demand for cars decreases, and thus the equilibrium price of cars decreases and quantity decreases.



(v) Same as (i)

(vi) If the ceiling is above the market price then nothing happens. If the ceiling is below the market price then the price (P_c) and quantity sold (Q_s) decrease.

