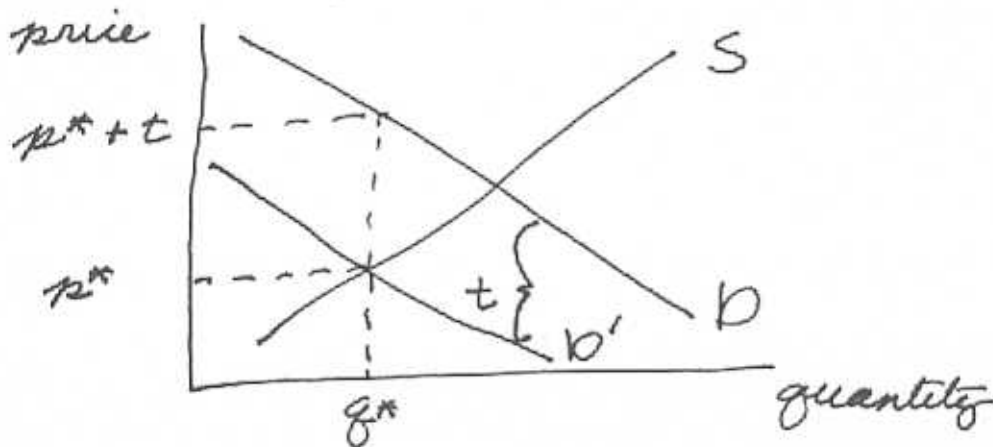


Practice Questions for Experiment 3

True-False Questions:

1. The real effects of a per-unit sales tax are no different whether the tax is collected from sellers or from buyers. (True)

The supply and demand curves are S and D .
A tax of t per unit is levied on buyers.
Demand shifts down to D' .



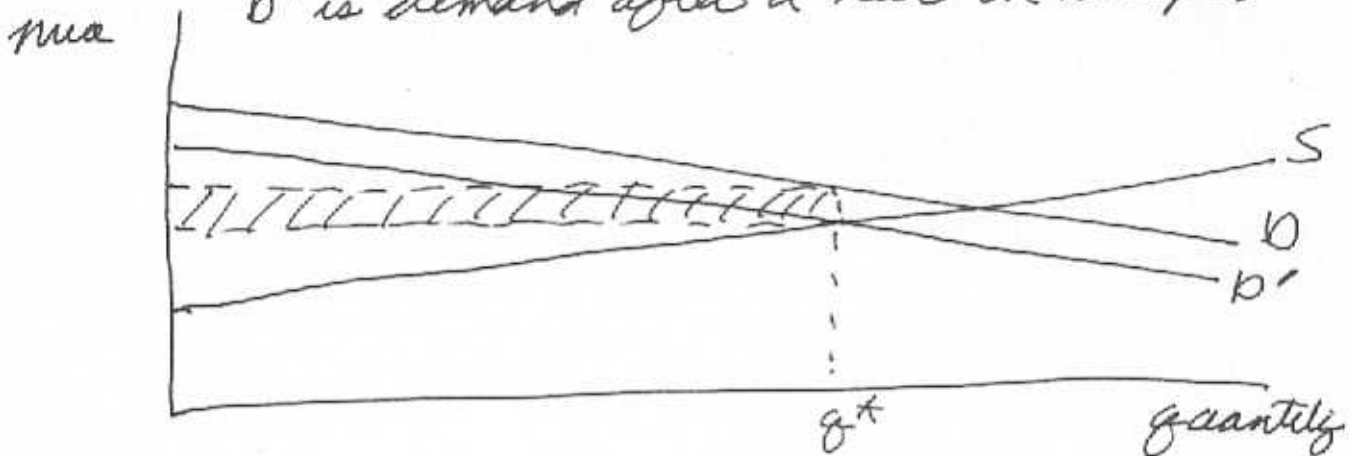
The equilibrium price is p^* , which is the price sellers receive. The net price to buyers is $p^* + t$. If buyers have a price of $p^* + t$ and sellers have a price of p^* , demand equals supply at q^* .

Suppose the price is levied on sellers. Then the new equilibrium price is p^{**} , which equals $p^* + t$. This is the same price buyers paid before, net of the tax. The net price to sellers is $p^{**} - t$, which is just p^* , the same price as before. Hence, this new price is an equilibrium and nothing has changed.

2. If the per-unit sales tax on a good is increased, the revenue from that tax necessarily increases. (False)

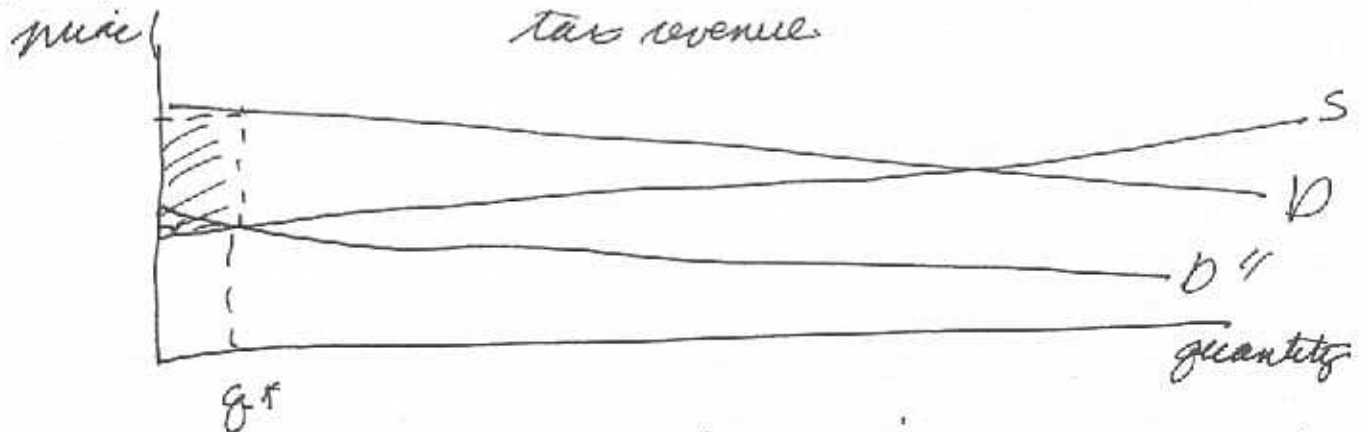
Consider the case of very elastic supply and demand, S and D are supply and demand.

D' is demand after a tax on buyers



The cross-hatched area is tax revenue.

now consider a higher tax as in the diagram below. The cross hatched area is tax revenue.

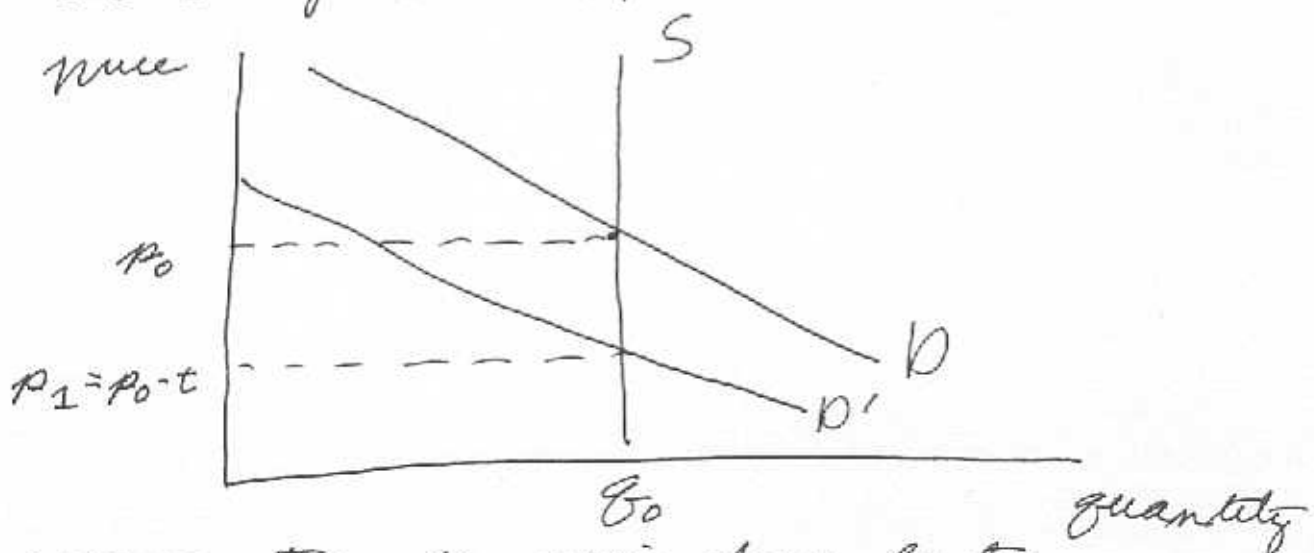


The higher tax has reduced quantity so much that tax revenue has declined. An even higher tax would drive quantity and revenue to zero.

3. The loss to buyers and sellers from a tax is always greater than the revenue raised by the tax. (False)

In other words, is the excess burden always positive. As I showed you in lecture and you discovered in your homework, excess burden is actually zero when supply (or demand) is perfectly inelastic.

Suppose supply is perfectly inelastic and a tax is levied on buyers, as in the diagram below.



After the tax, the price drops by the amount of the tax. Buyers have the same profit as before. Sellers' profits decline from $P_0 Q_0$ to $P_1 Q_0$, which equals $(P_0 - t) Q_0 = P_0 Q_0 - t Q_0$. So seller profit declines by the amount of the tax, and thus there is no excess burden.

4. If the supply curve of a good is perfectly inelastic, a tax on sellers of that good does not increase the competitive equilibrium price of the good.
(True)

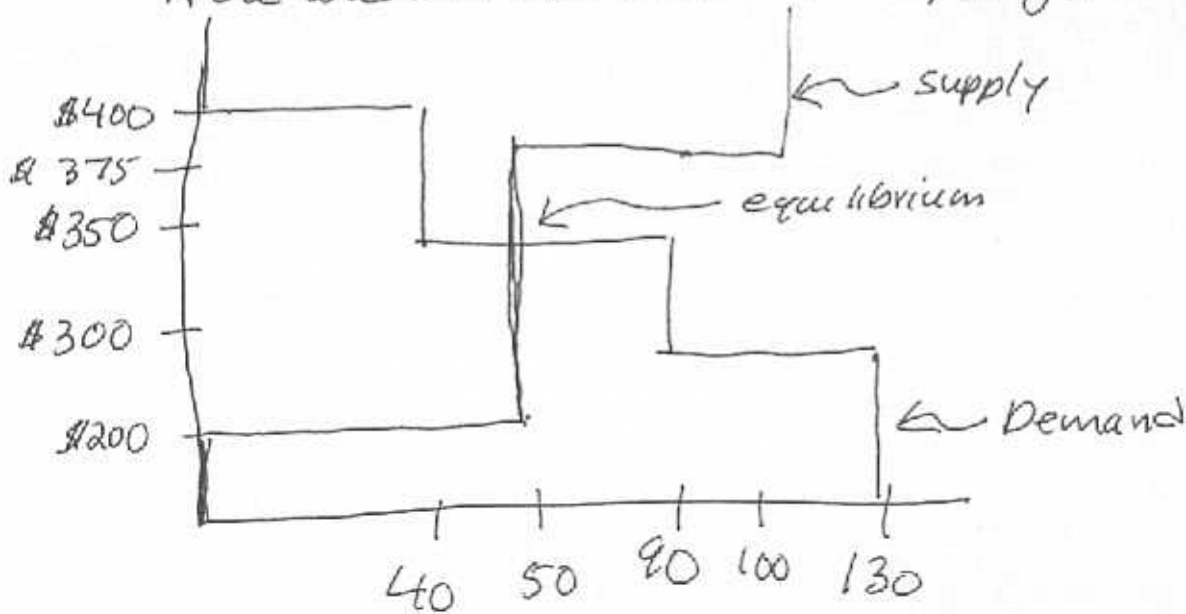
If supply is perfectly inelastic, the amount supplied by sellers does not change with the price. Hence a tax on seller doesn't affect supply and thus it does not change the equilibrium price.

Multiple Choice Questions:

5. In Brass Monkey, Montana, there is a competitive market for used snowmobiles. In this market, there are 40 demanders willing to pay up to \$400, 50 demanders willing to pay up to \$350, and 40 demanders willing to pay up to \$300. There are 50 suppliers who are willing to sell their snowmobiles at any price of \$200 or higher but will not sell for less than that amount. There are 50 suppliers who are willing to sell their snowmobiles at any price above \$375 but will not sell for less than that amount. Each demander can buy at most one unit, and each seller can supply at most one unit. In the absence of a sales tax, what would be the competitive equilibrium price P and quantity Q ? (a)

- (a) $P = \$350, Q = 50$
- (b) $P = \$375, Q = 40$
- (c) $P = \$300, Q = 100$
- (d) $P = \$200, Q = 75$

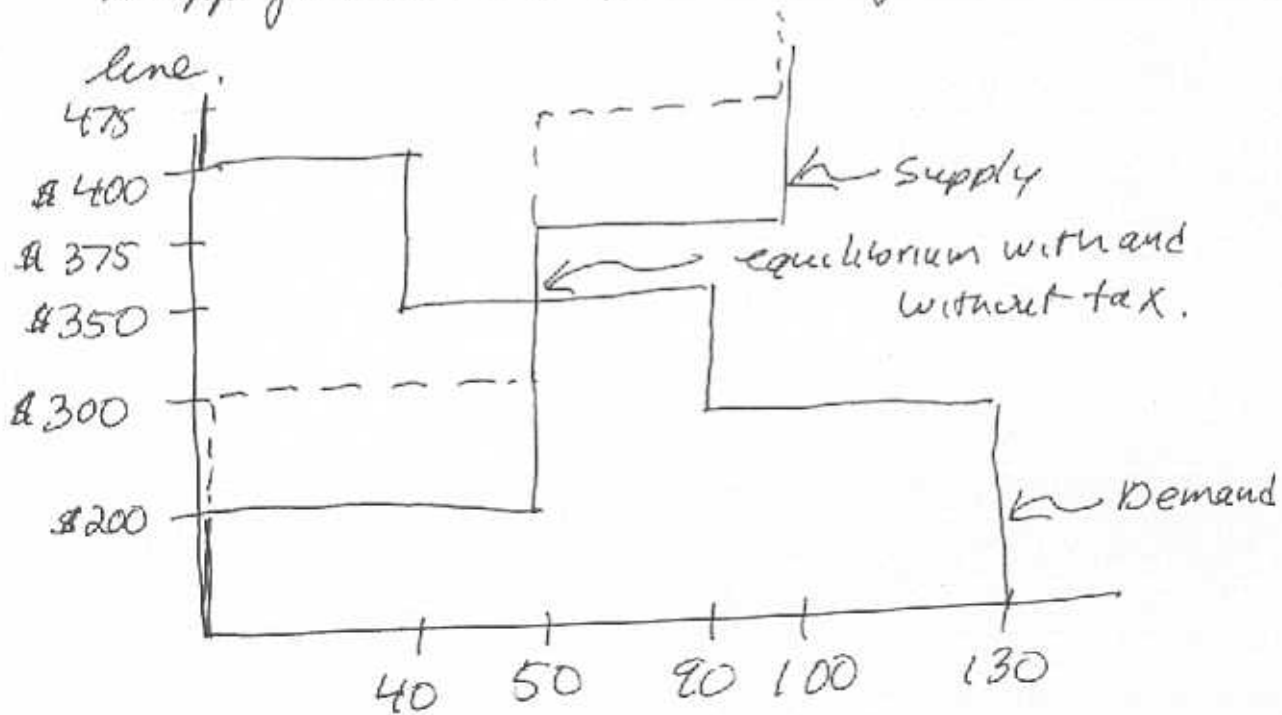
Here are the demand and supply functions.



In equilibrium, $P = \$350$ and $Q = 50$

6. A \$100 sales tax that is paid by suppliers will cause the price that demanders pay for snowmobiles in Brass Monkey to be (d)
- (a) \$100 higher than the equilibrium price without taxes.
 - (b) \$75 higher than the equilibrium price without taxes.
 - (c) \$75 lower than the equilibrium price without taxes.
 - (d) the same as the equilibrium price without taxes.

A tax of \$100 on suppliers will shift up the supply curve by \$100. The new supply curve is represented by the dashed line.



The competitive equilibrium doesn't change.

7. How much excess burden is caused by the \$100 tax on sales of used snowmobiles in Brass Monkey? (b)

- (a) \$8,000
- (b) \$0
- (c) \$9,500
- (d) \$1,000

Before the tax, suppliers made a profit of

$$(\$350 - \$200) \times 50 = \$7,500$$

After the tax, suppliers make a profit of

$$(\$350 - \$100 - \$200) \times 50 = \$2,500$$

The tax causes a loss of \$5,000.

Buyers have the same profit before and after the tax.

The tax revenue is $(\$100) \times 50 = \$5,000$

Excess burden is the loss in profits minus the tax revenue.

Loss in profits	\$5,000
Tax revenue	<u>\$5,000</u>
Excess burden	\$0

8. The supply curve of gold is given by the function $p=10+q$, where p is the price of an ounce of gold and q is ounces of gold. The demand curve for gold is given by the function $p=310-3q$. Suppose the government were to levy a sales tax of \$10 per ounce on the sale of gold. The tax would be collected from sellers of gold. How would this tax affect the price of gold paid by buyers in a competitive equilibrium? (c)

- (a) The price would decline by \$2.50 per ounce.
- (b) The price would rise by \$5.00 per ounce.
- (c) The price would rise by \$7.50 per ounce.
- (d) The price would rise by \$10.00 per ounce.

Before the tax:

$$10 + q = 310 - 3q$$

$$4q = 300$$

$$q = 75$$

$$p = 85$$

*The tax shifts the supply curve up by \$10
so supply is $p = 20 + q$. Solving for equilibrium:*

$$20 + q = 310 - 3q$$

$$4q = 290$$

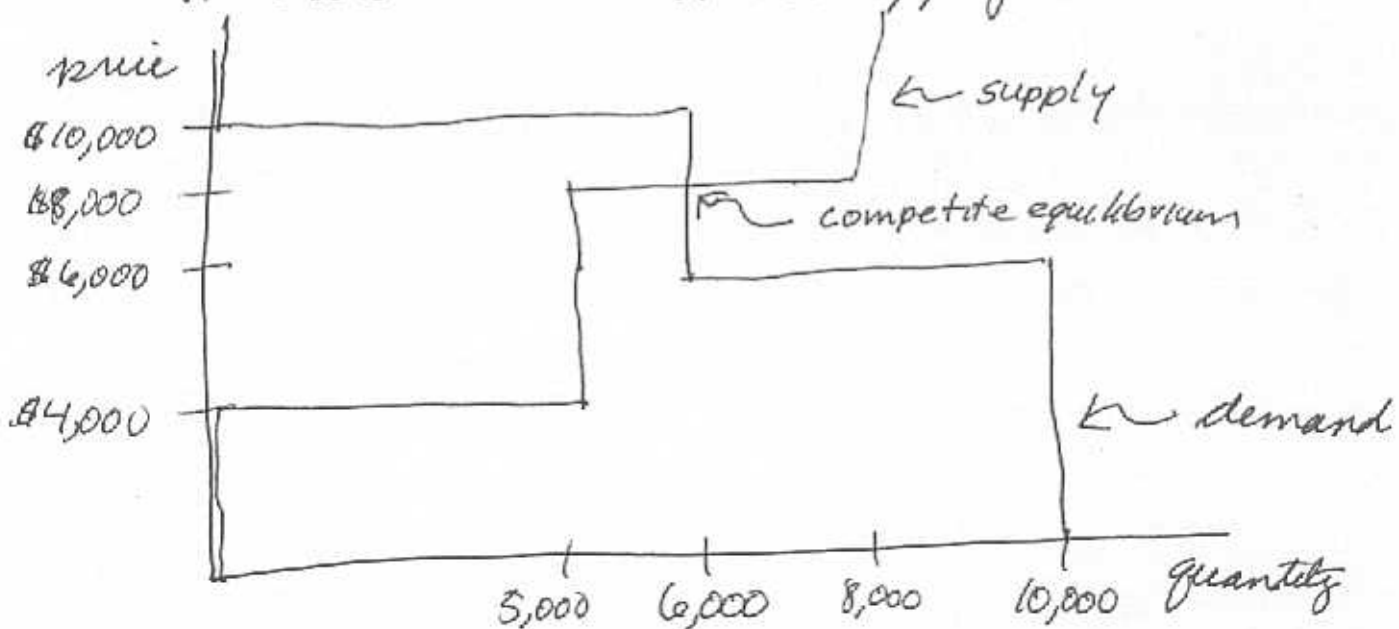
$$q = 72.5$$

$$p = \$92.5$$

Price has increased by \$7.50

9. There are 10,000 families, each with one school age child. Six thousand of those families would be willing to pay as much as \$10,000 per year to have their child educated in a private school rather than a free public school. The remaining four thousand of those families would be willing to pay as much as \$6,000 for a private school education for their child. There are 80 entrepreneurs willing to open a private school. Each school would enroll 100 students. Fifty of those entrepreneurs are willing to operate a private school if they receive at least \$4,000 per year in tuition for each child they educate. The remaining 30 of those entrepreneurs are willing to operate a school if they receive tuition of \$8,000 per year for each child they educate. What is the competitive equilibrium tuition P and private school enrollment Q ? (c)
- $P = \$4,000$ and $Q = 4,000$
 - $P = \$6,000$ and $Q = 6,000$
 - $P = \$8,000$ and $Q = 6,000$
 - $P = \$10,000$ and $Q = 5,000$

Here are the demand and supply curves.



The competitive equilibrium is

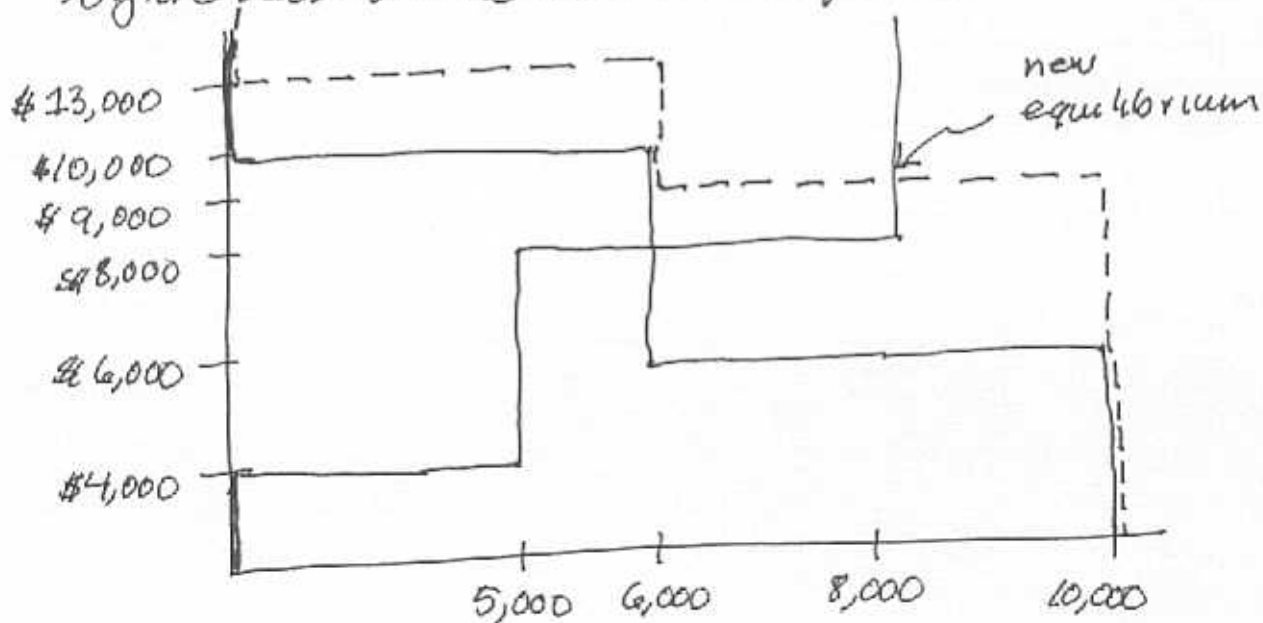
$$P = \$8,000$$

$$Q = 6,000$$

10. Suppose that the market for private schools is described as in question 9 above. If the state government were to pay each family a subsidy of \$3,000 per child educated in private school, what would be the equilibrium tuition P and private school enrollment Q ? (c)

- a. $P = \$3,000$ and $Q = 5,000$
- b. $P = \$6,000$ and $Q = 6,000$
- c. $P = \$9,000$ and $Q = 8,000$
- d. $P = \$10,000$ and $Q = 8,000$

The subsidy would shift the demand curve up by \$3,000. The new demand curve is represented by the dashed line in the diagram.



The new equilibrium is

$$P = \$9,000$$

$$Q = 8,000$$

11. If the market for private schools were as described in question 9 above, how would a \$3,000 subsidy for children in private school affect the profits of families and private school entrepreneurs? (a)

- Profits of families would increase by \$12 million, and profits of private school entrepreneurs would increase by \$8 million.
- Profits of families would increase by \$3 million, and profits of private school entrepreneurs would increase by \$5 million.
- Profits of families would increase by \$12 million, and profits of private school entrepreneurs would increase by \$15 million.
- Profits of families would not change, and profits of private school entrepreneurs would increase by \$5 million.

Before voucher:

$$\begin{aligned}\text{profit of high value families} &= (10,000 - 8,000)(6,000) = \$12\text{m} \\ \text{profit of low value families} &= 0 \\ \text{profit of low cost sellers} &= (8,000 - 4,000)(5,000) = \$20\text{m} \\ \text{profit of high cost sellers} &= 0\end{aligned}$$

After voucher:

$$\begin{aligned}\text{profit of high value families} &= (10,000 - 6,000)(6,000) = \$24\text{m} \\ \text{profit of low value families} &= (6,000 - 6,000)(2,000) = 0 \\ \text{profit of low cost sellers} &= (9,000 - 4,000)(5,000) = \$25\text{m} \\ \text{profit of highest seller} &= (9,000 - 8,000)(3,000) = \$3\text{m}\end{aligned}$$

Profit of families increases from \$12m to \$24m.

Profit of suppliers increases from \$20m to \$28 million.

12. If the market for private schools were as described in question 9 above and the state were to provide a \$3,000 subsidy for children in private schools, how would the total profits from the subsidy for families and private school entrepreneurs compare with the cost of the subsidy to the state government? (d)

- a. The cost of the subsidy would be \$5 million less than the increase in the total profits of families and entrepreneurs.
- b. The cost of the subsidy would be \$9 million more than the increase in the total profits of families and entrepreneurs.
- c. The cost of the subsidy would equal the total profits of families and entrepreneurs.
- d. The cost of the subsidy would be \$4 million more than the increase in the total profits of families and entrepreneurs.

Profits increased by \$20 million

The cost of the subsidy is $\$3,000 \times 8,000 = \24 million.

The \$4 million extra is the deadweight loss of the subsidy.