

Homework Quiz: Tuesday, October 21

3. Chapter 7, Numerical Exercises N1, N2

N1.

a. Since firms will produce where $P=MC$, each firm will produce 5 units at a price of \$10. The firms will earn a profit of $5 * \$10 - \$36 = \$14$. The industry is not in the long-run, because the firms are making a positive economic profit.

b. In the long-run there will be entry into this industry. The firms will earn zero profit and will produce where $P=MC=ATC$. This happens when $q=3$ and $p=6$.

N2.

a. Since the industry is in long-run equilibrium, $P=MC=ATC$. This happens at $P=\$15$.

b. At $P=\$15$, industry demand is 450 and each firm produces 3 units, so there are $450/3=150$ firms.

c. At $P=\$10$, each firm produces 2 units. Since there are 150 firms, the quantity $150 * 2=300$ will correspond to a price of \$10.

4. Widgets are provided by a competitive constant-cost industry where each firm has fixed costs of \$30. The following chart shows the industry-wide demand curve and the marginal cost curve of a typical firm.

Industry Wide Demand		Firm's Marginal Cost Curve	
Price	Quantity	q	MC
\$5	1500	1	\$5
10	1200	2	10
15	900	3	15
20	600	4	20
25	300	5	25
30	200	6	30
35	140	7	35
40	50	8	40

a. Assume the industry is at its long-run competitive equilibrium. What is the price of a widget?

$$P=MC=ATC=\$20$$

b. How many firms are in the industry?

$$\text{At } P=\$20, \text{ each firm produces 4 units (q). Industry-wide demand is 600 (Q). \# firms} = Q/q = 600/4 = 150 \text{ firms}$$

Suppose there is a SALES tax of \$15 per widget.

c. In the short run, what is the new price of widgets?

Need to put in industry supply curve: get this by multiplying 150 firms by q at each price. Change demand prices to reflect the tax- remember a sales tax lowers the corresponding price by the amount of the tax. So, lower each price by \$15. Now, find where new industry demand equals industry supply. This happens where $p= \$10$ and $Q= 300$.

d. In the short run, how many firms leave the industry?

In the SR, the number of firms is fixed. So, no firms leave!

e. In the long-run what is the new price of widgets?

Our MC hasn't changed with sales tax. So, our original condition, $P=MC=ATC=\$20$ must hold in any LR equilibrium. In LR, price goes back up to \$20.

f. In the long-run, how many firms leave the industry?

At a price of \$20, industry demand is now only 140. Each firm is producing 4 units. So, new $Q/q = 140/4 = 35$ firms. Thus, $150 - 35 = 115$ firms have left the industry in the LR.

3. The marginal revenue curve of a competitive firm is
 - a. U-shaped.
 - b. a ray from the origin.
 - c. **a horizontal line at the market price.**
 - d. downward sloping.

4. A firm will shut down in the short run if its revenues fail to cover its
 - a. fixed costs.
 - b. **variable costs.**
 - c. total costs.
 - d. sunk costs.

5. A competitive firm will exit an industry in the long run when the market price falls below its
 - a. marginal revenue.
 - b. marginal cost.
 - c. **average cost.**
 - d. average variable cost.

6. Suppose all firms in an industry are identical. In the long run, entry and exit guarantee that all firms will have zero
 - a. marginal cost.
 - b. average cost.
 - c. **economic profit.**
 - d. accounting profit.

7. Suppose the demand curve for a good is given by the equation $Q = -4P + 2500$ ($P = -1/4 * Q + 125$) and the supply curve is given by $Q = 2P - 100$ ($P = 1/2Q + 50$). The equilibrium price and quantity is \$100 and 100 units.
 - i. Calculate consumer surplus at this equilibrium price and quantity.
 $CS = [125 - 100] * 100 / 2 = \1250
 - ii. Calculate producer surplus at this equilibrium price and quantity.
 $PS = [100 - 50] * 100 / 2 = \2500
 - iii. Calculate total social gain at this equilibrium price and quantity.
 $SG = CS + PS = \$3750$

Now assume the government imposes a sales tax of \$6 per unit. With this tax, the new market price is \$96 and the new quantity is 92 units.

- i. Calculate the post-tax consumer surplus at this new equilibrium price and quantity.
 $CS = [125 - 102] * 92 / 2 = \1058
- ii. Calculate the post-tax producer surplus at this new equilibrium price and quantity.
 $PS = [96 - 50] * 92 / 2 = \2116
- iii. Calculate the tax revenue collected from the government.
 $TAX = \$6 * 92 = \552
- iv. Calculate the post-tax total social gain assuming the tax revenue is re-distributed to support public education.
 $SG = CS + PS + TAX = \$3726$
- v. Calculate deadweight loss.
 $DWL = SG \text{ before tax} - SG \text{ after tax} = \24
- vi. Illustrate the effect of this tax graphically. Label the following areas as follows:
 1. A- consumer surplus
Triangle: Height: On y-axis- distance between 125 and 102.
Base: out to 92 units
 2. B- producer surplus
Triangle: Height: On y-axis from 96 down to 50.
Base: out to 92 units

3. C- tax revenue

Rectangle: Height: distance on y-axis from 102 down to 96.

Base: out to 92 units

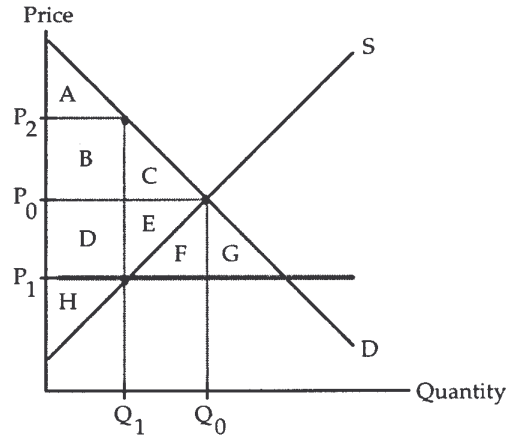
4. D- deadweight loss

Triangle: Base: from 102 to 96 on y-axis

Height: from 92 to 100 units on x-axis

Price Ceiling

The following questions refer to the accompanying diagram which shows the effects of a price ceiling. The initial price and quantity are P_0 and Q_0 , respectively, and the price ceiling is imposed at the price P_1 . Assume that none of the potential deadweight loss can be avoided.



8. Refer to Price Ceiling. Area B + D represents

- the deadweight loss due to the price ceiling.
- the fall in consumers' surplus caused by the imposition of the price ceiling.
- the value of the time and resources spent by consumers to acquire the limited supply.**
- the post-ceiling profits earned by the producers of the good.

9. Refer to Price Ceiling. After the price ceiling is imposed, consumers' surplus is equal to

- area A.**
- area A + B.
- area A + B + D.
- area A + B + C + D + E + F + G.

10. Refer to Price Ceiling. The price ceiling creates a deadweight loss equal to

- area A + H.
- area B + C + D + E.**
- area B + D.
- area C + E.

11. Relative to before the price ceiling, how much surplus do producers lose because of the ceiling?

- Area D+E+H
- Area D+E**
- Area D+E+F
- Area H.

12. Refer to an Edgeworth Box Economy. The initial holdings of an individual in an Edgeworth box is referred to as

- the contract point.
- the endowment point.**
- the Pareto preferred point.

d. the competitive equilibrium point.

13. Refer to an Edgeworth Box Economy. In an Edgeworth box, points within the region of mutual advantage represent allocations that

- a. can be achieved by a competitive market.
- b. both consumers prefer to the initial endowment.**
- c. exhaust the potential gains from trade.
- d. are Pareto optimal.

14. Refer to an Edgeworth Box Economy. In an Edgeworth box, a point where two indifference curves are tangent represents

- a. the initial endowment point.
- b. an allocation that both consumers prefer to the initial endowment.
- c. a competitive equilibrium.
- d. a Pareto-optimal allocation of goods.**

15. Refer to an Edgeworth Box Economy. Analysis of an Edgeworth box economy shows that a competitive equilibrium

- a. must be Pareto optimal.**
- b. can be located anywhere along the contract curve.
- c. may lie anywhere within the region of mutual advantage.
- d. must lie to the southeast of the endowment point.