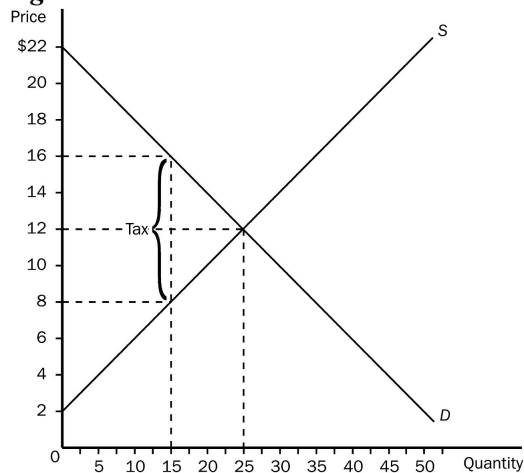


Problem Set 3

SOLUTIONS

1. Using *Figure 1* below, determine each of the following:
 - a. equilibrium price before the tax: 12
 - b. consumer surplus before the tax: 125
 - c. producer surplus before the tax: 125
 - d. total surplus before the tax: 250
 - e. consumer surplus after the tax: 45
 - f. producer surplus after the tax: 45
 - g. total tax revenue to the government: 120
 - h. total surplus after the tax: $45 + 45 + 120 = 210$
 - i. deadweight loss: $250 - 210 = 40$

Figure 1



(45 points, 5 points each)

2.
 - a. The market for alcohol is shown in Figure 2 below. The social value curve is below the demand curve because of the negative externality from increased motor vehicle accidents caused by those who drink and drive. The free-market equilibrium level of output is Q_{market} and the efficient level of output is Q_{optimum} .
 - b. The triangular area between points A, B, and C represents the deadweight loss of the market equilibrium. This area shows the amount by which social costs exceed social value for the quantity of alcohol consumption beyond the efficient level.

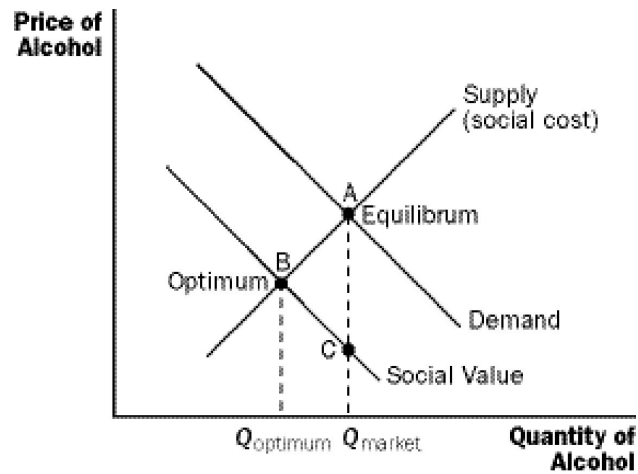
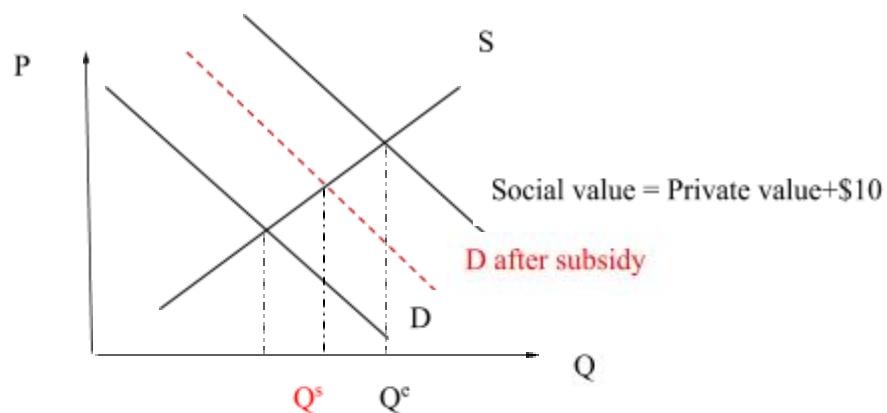


Figure 2

3. Suppose that flu shots create a positive externality equal to \$12 per shot. Further suppose that the government offers a \$5 per-shot subsidy to consumers.
True: the equilibrium quantity after subsidy (Q^e) is less than the socially optimal quantity (Q^s). See graphical illustration below. (5 points)



4. Place each of the following in the correct location in the table

| | | Rival? | |
|-------------|-----|---|---|
| | | Yes | No |
| Excludable? | Yes | <u>Private Goods</u> Clothing Congested toll roads | <u>Natural Monopolies</u> Cable TV Uncongested toll roads |
| | No | <u>Common Resources</u> Clean air Fish in the ocean Congested non-toll roads | <u>Public Goods</u> Fireworks General knowledge National defense |

(10 points)

5. Pudge Buffet is a corn farmer who lives in Lincoln, Nebraska. His payments for land and equipment rental and for other supplies come to \$10,000 per year. The only input he supplies is his own labor, and he considers farming just as attractive as his only other employment opportunity, managing a retail store at a salary of \$11,000 per year. Apart from the matter of pay, Pudge is indifferent between farming and being a manager. Corn sells for a constant price per bushel in an international market too large to be affected by changes in one farmer's corn production. Pudge's revenue from corn sales is \$20,000 per year.

Table 1. Revenue, Cost, and Profit Summary

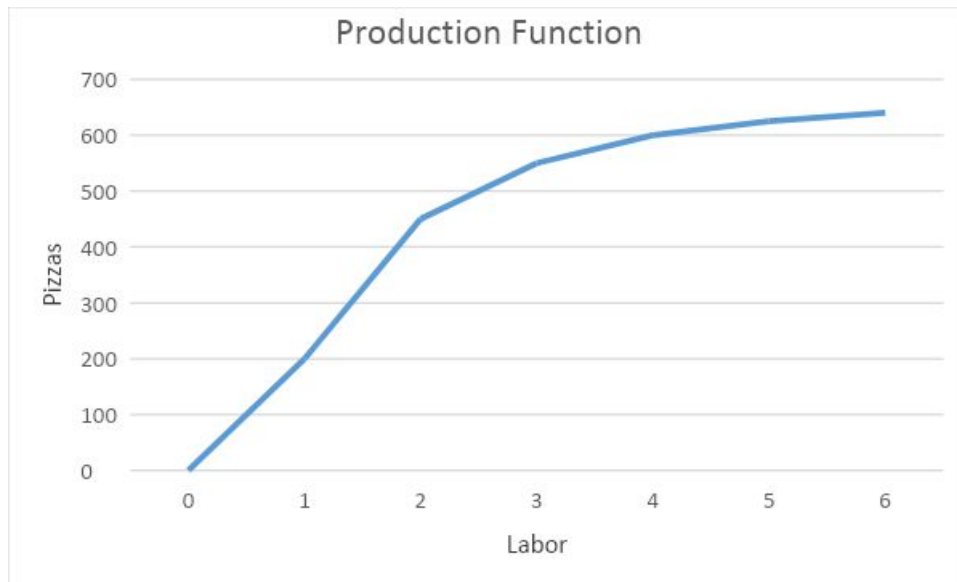
| Total revenue (\$/year) | Explicit costs (\$/year) | Implicit costs (\$/year) | Accounting profit (\$/year) | Economic profit (\$/year) |
|-------------------------|--------------------------|--------------------------|-----------------------------|---------------------------|
| 20,000 | 10,000 | 11,000 | 10,000 | -1,000 |

Although accounting profit is positive, economic profit is negative so he should exit. (10 points)

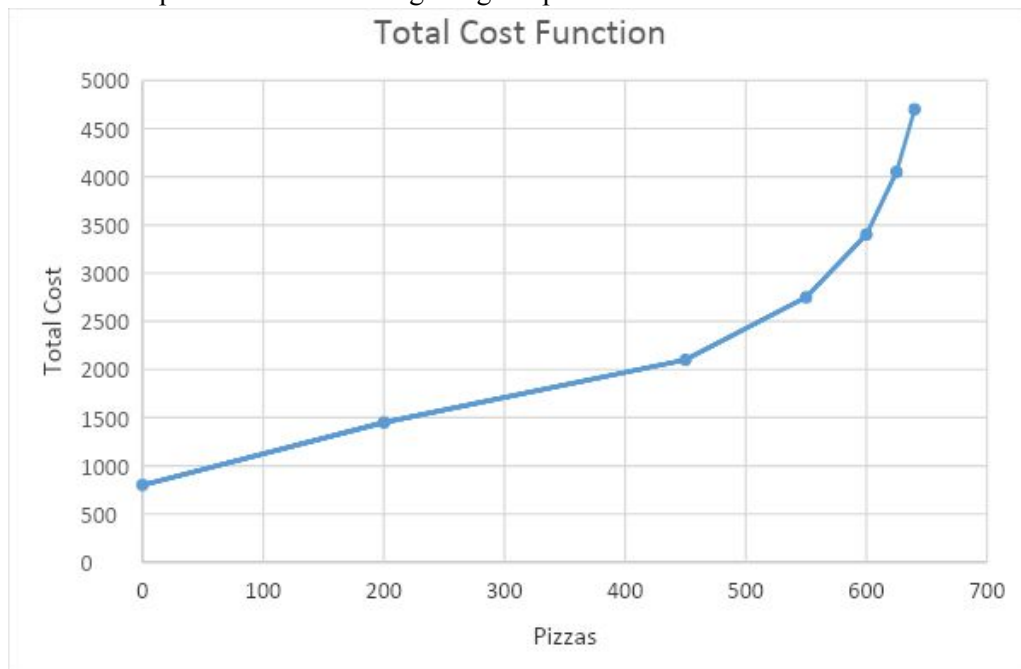
6. Table below shows short-run production at Jill Johnson's Restaurant.

| Quantity of workers | Quantity of pizzas per week | MPL | Variable Cost | Total Cost | MC | ATC |
|---------------------|-----------------------------|-----|---------------|------------|-------|------|
| 0 | 0 | - | 0 | 800 | - | - |
| 1 | 200 | 200 | 650 | 1450 | 3.25 | 7.25 |
| 2 | 450 | 250 | 1300 | 2100 | 2.6 | 4.67 |
| 3 | 550 | 100 | 1950 | 2750 | 6.5 | 5 |
| 4 | 600 | 50 | 2600 | 3400 | 13 | 5.67 |
| 5 | 625 | 25 | 3250 | 4050 | 26 | 6.48 |
| 6 | 640 | 15 | 3900 | 4700 | 43.33 | 7.34 |

- What is the marginal product of labor? See Table above.
- Use these data to graph production function. Explain its shape. Production function exhibits diminishing marginal product of labor.



- c. Workers are paid \$650 per week and fixed costs (pizza ovens and rent) are \$800 per week. Calculate total cost and graph total cost curve. Explain its shape. TC function becomes steeper due to diminishing marginal product.



- d. Calculate Jill's marginal cost and average total cost. See table above. (20 points, 5 points each)