

Economics 500: Microeconomic Theory  
State University of New York at Binghamton  
Department of Economics  
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Problem Set #8

1. John's Lawn Mowing Service is a small business that acts as a price taker ( $MR = P$ ). The prevailing market price of lawn mowing is \$20 per acre. John's costs are given by

$$TC = 0.1q^2 + 10q + 50$$

where  $q$  is the number of acres John chooses to cut a day.

- a. How many acres should John choose to cut in order to maximize profit?
  - b. Calculate John's maximum daily profit.
  - c. Graph these results and label John's supply curve.
2. Would a lump-sum tax affect the profit-maximizing quantity of output? How about a proportional tax on profits? How about a tax assessed on each unit of output?
3. A firm faces a demand curve given by

$$q = 100 - 2p$$

Marginal and average costs for the firm are constant at \$10 per unit.

- a. What output level should the firm produce to maximize profits? What are profits at that output level?
  - b. What output level should the firm produce to maximize revenues? What are profits at that output level?
  - c. Suppose the firm wishes to maximize revenues subject to the constraint that it earns \$12 in profits for each of the 64 machines it employs. What level of output should it produce?
  - d. Graph your results.
4. The production function for a firm in the business of calculator assembly is given by

$$q = 2(L)^{1/2}$$

where  $q$  is finished calculator output and  $L$  represents hours of labor input. The firm is a price taker for both calculators (which sell for  $P$ ) and workers (which can be hired at a wage rate of  $w$  per hour).

- a. What is the supply function for assembled calculators ( $q = q(p,w)$ )?
- b. Show explicitly how changes in  $w$  shift the supply curve for this firm.