1a. Given the (Q) and price (P) data in the following table, calculate the related total revenue (TR), marginal revenue (MR), and average revenue (AR) figures:

Q P TR MR AR

0 $10

1 9

2 8

3 7

4 6

5 5

6 4

7 3

8 2

9 1

10 0

b. Graph this data using “dollars” on the vertical axis and “quantity” on horizontal axis. At what output level revenue maximized?

c. Why is marginal revenue less than average revenue at each price level?

2a. Fill in the missing data for price (P), total revenue (TR), marginal revenue (MR), total cost (TC), marginal cost (MC), profit (, and marginal profit (Mthe following table:

Q P TR MR TC MC M

0 $160 $0 $-- $0 $--- $0 $---

1 150 150 150 26 25 125 125

2 140 55 30 100

3 390 35 300 75

4 90 130 350

5 110 550 175

6 600 50 55 370

7 630 290 60 -30

8 80 640 355 285

9 75 -85

10 600 525

B. At what output level is profit maximize?

C. At what output level is revenue maximized?

D. Discuss any differences in your answers to parts B and C.

3. Characterize each of following statements as true or false, and explain your answer.

A. If marginal revenue is less than average revenue, the demand curve will downward sloping.

B. Profits will be maximized when total revenue equals total cost.

C. Given a downward-sloping demand curve and positive marginal costs, profit-maximizing firms will always sell less output at higher prices than will revenue-maximizing firms.

D. Marginal cost must be falling for average cost to decline as output expands.

E. Marginal profit is the difference between marginal revenue and marginal cost and will always equal zero at the profit-maximizing activity level.

4. Jessica Simpson is the regional sales representative for Dental Laboratories, Inc. Simpson sells alloy products created from gold, silver, platinum, and other precious metal to several dental laboratories in Maine, New Hampshire, and Vermont. Simpson’s goal is to maximize her total monthly commission income, which is figured at 10% of gross sales. In reviewing her monthly experience over the past year, Simpson found the following relations between days spent in each state and monthly sales generated:

Maine New Hampshire Vermont

Days Gross Sales Days Gross Sales Days Gross Sales

1. $4,000 0 $0 0 $2,500
2. 10,000 1 3,500 1 5,000
3. 15,000 2 6,500 2 7,000
4. 19,000 3 9,000 3 8,500
5. 22,000 4 10,500 4 9,500
6. 24,000 5 11,500 5 10,000
7. 25,000 6 12,000 6 10,000
8. 25,000 7 12,500 7 10,000

A. Construct a table showing Simpson’s marginal sales per day in each state.

B. If administrative duties limit Simpson to only selling days per month, how should she spend them?

C. Calculate Simpson’s maximum monthly commission income.

5. Climate Control Devices, Inc., estimates that sales of defective thermostats cost the firm an average of $25 each for replacement or repair. An independent engineering consultant has recommended hiring quality control inspectors so that defective thermostats can be identified and corrected before shipping. The following schedule shows the expected relation between the number of quality control inspectors and the thermostat failure rate, defined in terms of the percentage of total shipments that prove to be defective.

Number of Quality Control Inspectors Thermostat Failure Rate (percent)

0 5.0

1. 4.0
2. 3.2
3. 2.6
4. 2.2
5. 2.0

The firm expects to ship 250,000 thermostats during the coming year, and quality control inspectors each command a salary of $30,000 per year.

A. Construct a table showing the marginal failure reduction (in units) and the dollar value of these reductions for each inspector hired.

B. How many inspectors should the firm hire?

C. How many inspectors would be hired if additional indirect costs (lost customer goodwill and so on) were to average 30% of direct replacement repair costs?