Name:_____ Date:_____

Pre Calculus 11 Ch2.7 Revenue Optimization Problems 2025

$$\frac{Q-Q_o}{P-P_0}=\frac{\Delta Q}{\Delta P} \qquad Q=\frac{\Delta P}{\Delta Q}\left(P-P_0\right)+Q_o \qquad R=P\times Q$$

1. Quantity is defined as the number of units sold and Price is the cost of each unit that is being sold. What is the relationship between Quantity and Price? Is it linear or quadratic? Explain

2. Why is revenue equal to "price" times "quantity"? What is "revenue"?

3. Is the slope for the relationship between "price" and Quantity" always going to be "positive" or "negative"? Explain

4. Is the relationship between "revenue" and "price" linear or quadratic? Explain:

5. Is the relationship between "revenue" and "quantity" linear or quadratic? Explain:

6. Explain what each of the following notations represent: Q_o , P_o , ΔQ , and ΔP

7. What does $\frac{\Delta Q}{\Delta P}$ represent?

8. When writing the linear relationship between "price" and "quantity", which variable is the "x" independent variable? Which variable is the "y" dependent variable? Explain:

9. What is the wrong with each of the formulas below for the relationship between “price” and “quantity”?

$a)\ \frac{Q-Q_o}{P-P_0}=\frac{\Delta P}{\Delta Q}$ $b)\ \frac{P-P_o}{Q-Q_0}=\frac{\Delta P}{\Delta Q}$ $c)\ \frac{Q-Q_o}{P-P_0}=-\frac{\Delta Q}{\Delta P}$ $d)\ \frac{Q-\Delta Q}{P-\Delta P}=\frac{Q_o}{P_o}$

10. What does it mean to write the Quantity as a function of price? What would this equation be used for?

11. What does it mean to write the Price as a function of quantity? What would this equation be used for?

12. What does it mean to write the Revenue as a function of price? What would this equation be used for?

13. What is “EXPENSE”? Define it:

14. Is the relationship between “Expense” and “quantity” linear or quadratic? Explain:

15. How do you find “PROFIT”? What is the definition of it?

16. Is the relationship between “PROFIT” and “price” linear or quadratic? Explain

17. Is the vertex for the “Revenue” equation the same as the “Profit” equation? Explain:

Part 2: For each of the following scenarios below,

i) identity Q_o , P_o , ΔQ , and ΔP ,

ii) Write the slope equation between "P" and "Q"

iii) Write Quantity as a function of "price" (Isolate Q). Explain how the price will affect the quantity of units sold

iv) Write the Revenue as a function of "price"

v) Find the "price" that will generate the maximum revenue

18. A Broadway musical sells 400 tickets each day at $30 per ticket. For every increase of $3.00, they lose 20 sales. What should their ticket price be to yield the maximum revenue?

19. A company that charters a boat for tours around Vancouver Island can sell 200 tickets at $50 each. For every $10 increase in the ticket price, 5 fewer tickets will be sold. What ticket price will generate the maximum revenue?

20. A company sells its bikes at $300 each and can sell 70 in a season. For every $25 increase in the price, the number sold drops by 10. What price should the company sell their bikes to generate the maximum revenue?

21. A musical at Granville theatre sells for $250 a ticket and they average around 1500 tickets sold each week. They found that for every $10 increase, they would lose about 30 ticket sales. What price should they set their ticket price to generate the maximum weekly revenue?

Part 3: For each of the following:

i) Find the Quantity as a function of "price" ii) Find the Revenue equation as a function of "price

iii) Find the Expense equation of a function of "quantity" iii) Find the Expense equation of a function of "price"

iv) Find the PROFIT equation of a function of "price" v) Find the price that generates the maximum Revenue

vi) Find the price that generates the maximum Profit

22. A market sells apples at 2.25 each and sells a daily average of 250. For every 5 cent increase, they expect to lose about 10 sales. The daily expense is $15 plus $0.25 for each apple they sell. Find the price of an apple that generates the maximum profit.

23. Membership at Gold's gym is $55 a month and they have a monthly average of 340 members. They found that for every $5 drop in price, the number of members will increase by 15. The monthly expense to operate the business is $5000 plus $6 for each member. Find the price that will generate the maximum monthly profit

24. A burger stand sells about 450 burgers a week at $12.50 a burger. Research has shown that for each $1 increase, the number of burger sales will drop by 5. The cost to operate the business each week is $1500 and each burger cost $2 to make. Then what price will generate the maximum profit?