Module: MA4001NI- Logic and Problem Solving

Tutorial: Breakeven Problems

1. Suppose that one machine has a setup cost of $400 and a unit cost of $1.50, and a second machine has a setup cost of $500 and a unit cost of $1.25. Find the break point
   (the number of units manufactured at which the cost on each machine is the same).

2. An ATM has a setup cost of $3,000 and operating costs averaging $1 per transaction. Another ATM machine has a setup cost of $3,500 and an operating cost of $0.50 per transaction. Find the number of transactions at which the costs for each ATM is the same.

3. A machine to manufacture fasteners has a setup cost of $1,200 and a unit cost of $0.005 for each fastener manufactured. A newer machine has a setup cost of $1,500 but a unit cost of only $0.0015 for each fastener manufactured. Find the break point.

4. A machine to mill a brass plate has a setup cost of $600 and a unit cost of $3 for each plate manufactured. A bigger machine has a setup cost of $800 but a unit cost of only $2 for each plate manufactured. Find the break point.

5. The publisher of a newsletter estimates that with x thousand subscribers its monthly revenue and cost (in thousands of dollars) are given by the following:

   $$R(X) = -0.21x^2 + 32x$$
   $$C(x) = 12x + 195$$

   Determine the number of subscribers needed for the publisher to break-even.

6. Cost Function $C(Q) = 8q + 3200$
   Revenue Function $R(Q) = -10p^2 + 850p$
   Find the breakeven point(s) for this scenario. Identify the ticket price(s) that will produce the break-even point(s).

7. The cost of a ticket to the circus is $25 for children and 50$ for adults. On a certain day, attendance at the circus is 2,000 and the total gate revenue is 70,000. How many children and how many adults bought tickets?

8. A cell phone factory has a cost of production $C(x) = 150x + 10{,}000$ and a revenue function R(x) =200x. What is the breakeven point?

9. A musician charges $C(x) = 64x + 20{,}000$, where x is the total number of attendees at the concert. The venue charges $80 per ticket. After how many people buy tickets does the venue break even, and what is the value of the total tickets sold at that point?

10. The demand function for Q units of a product is given by $D(Q) = 16 - 1.25Q$
    The cost function is given by the function $C(Q) = 2Q + 15$

    a) Find the revenue function R(Q)
    b) Find the breakeven point(s).
    c) On a graph of R(Q) and C(Q), where do the breakeven points lie?
    d) Find the profit function P(Q).

11. The revenue function for a new product is $R(x) = 39x - 5x^2$, where x is the number sold in thousands. The cost function is $C(x) = 4x + 30$.
    a) How many items must be sold for the company to breakeven?
    b) What quantity of items sold will produce the maximum profit?