

Q1.

Find any relative extrema of

$$f(x) = x\sqrt{25 - x^2}$$

State where the function is increasing or decreasing and determine points of inflection.

Q2.

Find the absolute maximum and minimum values of

$$f(x) = \frac{x^2}{3x^3 + 1}$$

on $[0, +\infty)$.

Q3.

The total cost and total revenue functions are

$$C(x) = \frac{1}{3}x^3 - 8x^2 + 70x + 300$$

$$R(x) = x(200 - 4x)$$

a) Write the profit function $P(x)$ and determine the level of output that maximizes profit.

b) Verify that $MR = MC$ at that point.

Q4.

A rectangular field is enclosed using 800 meters of fencing on three sides, with one side along a river.

Find the dimensions that maximize the area.