

# Optimization Problems

(3.6)

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# Guidelines for Solving Applied Minimum & Maximum Problems:

1. Apply all given quantities and quantities to be determined. Make a sketch, if possible.
2. Write a primary equation for the quantity that is to be maximized or minimized.
3. Use any secondary equations to reduce the primary equation to a single independent variable.
4. Determine the feasible domain of the word problem with respect to the equation.
5. Determine the desired maximum or minimum value by applying calculus techniques such as the First & Second Derivative Tests, testing interval endpoints, etc.

Ex. 1: Find two positive numbers such that the second number is the reciprocal of the first and the sum is a minimum.

Ex. 2: A rancher has 200 feet of fencing with which to enclose two adjacent rectangular corrals. What dimensions should be used so that the enclosed area will be a maximum? (The corrals should be congruent).

Ex. 3: A rectangle is bounded by the x-axis and the semicircle  $y = \sqrt{144 - x^2}$ . What length and width should the rectangle have so that the area is a maximum?

