

Lesson 24: Section 4.5 (Part 1)

Optimization Problems

- Optimization = using calculus to find the maximum or minimum for real-world situations
- The objective function is the function we want to maximize or minimize (optimize)
- A constraint is a condition the variables must satisfy.
- So far, we only know how to optimize functions with one independent variable.
We must write our objective functions as a ~~one~~ variable function.

Optimization Strategy

1. Read the problem carefully, identify the variables, and organize the given information with a picture.
2. Identify the objective function and write it in terms of the variables of the problem.
3. Identify the constraints. Write them in terms of the variables of the problem.
4. Use the constraint(s) to eliminate all but one independent variable.
5. Find the interval of interest for the objective function.
6. Use methods of calculus to find the absolute max/min on the interval of interest.
7. Answer the question.

Practice Problems

1. Find the point(s) closest to the origin on the graph $y = 2 - x^2$. (Hint to simplify the objective function: If $f(x) \geq 0$, then the relative extrema of $y = f(x)$ occur at the same x -values as the relative extrema of $y = (f(x))^2$.)

2. The USPS states that:

"no mailpiece may measure more than 108 inches in length and girth combined. Length is the measurement of the longest dimension and girth is the distance around the thickest part (perpendicular to the length)."

you want to mail a cylindrical package as shown. What is the volume of the largest cylindrical package that can be mailed? (Round to the nearest in^3).

