1. A shipping company requires that the sum of length plus girth of rectangular boxes not exceed 108 in. Find the dimensions of the box with maximum volume that meets this condition.

2. Let $(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)$ be n fixed points and let $y = mx + b$ be some line in the plane. The sum of the square errors of the approximation $mx_i + b \approx y_i$ is computed as

$$E(m, b) = \sum_{i=1}^{n} ((mx_i + b) - y_i)^2$$

Find the coefficients m and b that minimize E.

3. Find the dimensions of the right circular cylinder of maximum volume that can be inscribed in a sphere of radius 16.

4. Find the points on the surface $x^{2n} + y^{2n} + z^{2n} = 1$ that are furthest from the origin. Let this distance be denoted by d_n, find $\lim_{n\to\infty} d_n$.

5. Find the absolute maximum and minimum values of $f(x, y) = \dfrac{2y^2 - x^2}{2 + 2x^2y^2}$ on the closed region R bounded by the lines $y = x, y = 2x, y = 2$.