1. [14.8.46] **A least squares plane** The plane \( z = Ax + By + C \) is to be “fitted” to the following points \( (x_k, y_k, z_k) \):

\[
(0, 0, 0) \quad (0, 1, 1) \quad (1, 1, 1) \quad (1, 0, -1)
\]

Find the values \( A, B, C \) that minimize

\[
\sum_{k=1}^{4} (Ax_k + By_k + C - z_k)^2
\]

the sum of the squares of the deviations.
2. [14.Prac.85] **Minimizing cost of a box** A closed rectangular box is to have volume $V \text{ cm}^3$. The cost of the material used in the box is $a$ cents/cm$^2$ for top and bottom, $b$ cents/cm$^2$ for front and back and $c$ cents/cm$^2$ for the remaining sides. What dimensions minimize the total cost of materials?
3. [14.Adv.13] **Minimum volume cut from first octant** Find the minimum volume for a region bounded by the planes \( x = 0, y = 0, z = 0 \) and a plane tangent to the ellipsoid

\[
\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1
\]

at a point in the first octant.