1. Let \( F(x, y, z) = (x, 1, 0) \). Verify the divergence theorem in the parallelepiped \([a, b] \times [c, d] \times [e, f]\) and in the ball centered at \((0, 0, 0)\) with radius \(R\).

2. Calculate the surface integral \( \int_S F(x, y, z) \cdot \nu(x, y, z) \, d\sigma(x, y, z) \), where \(S\) is the unit sphere in \(\mathbb{R}^3\) centered at the origin and \(F\) is the field \(F(x, y, z) = (2x, y^2, z^2)\).

   ANSWER: \(8\pi/3\).

3. Using the field \(F(x_1, \cdots, x_n) = (x_1, \cdots, x_n)\) and the divergence theorem, prove that the volume \(V\) of any bounded domain \(D \subset \mathbb{R}^n\) for which the divergence theorem holds equals

   \[
   V = \frac{1}{n} \int_{\partial D} |X - P| \cos(X - P, \nu) \, d\sigma(X),
   \]

   where \(P\) is any fixed point in \(\mathbb{R}^n\) and \((X - P, \nu)\) denotes the angle between \(X - P\) and \(\nu\) the outer unit normal to \(\partial D\) at the point \(X\).

   Conclude that if \(C\) is a cone in \(\mathbb{R}^{n+1}\) with base \(\Omega \subset \mathbb{R}^n\) and height \(h\), then the \(n + 1\)-dimensional volume of \(C\) equals

   \[
   \frac{|\Omega| \, h}{n + 1}
   \]

   where \(|\Omega|\) is the \(n\)-dimensional volume of the set \(\Omega\).