1. Evaluate

\[
\int \int_A (2x - 3y) \, dx \, dy,
\]

where \( A \) is the triangle with vertices \((0,0), (2,1)\) and \((2,0)\). Do the integral in both orders!

2. Find the moment of inertia

\[
I_x = \int \int \int (y^2 + z^2) \rho(x, y) \, dV,
\]

of the solid cone with surface \( x^2 + y^2 = z^2 \), with variable density \( \rho(x, y) = (x^2 + y^2)b \), with \( b \) a constant.

3. Consider a thin plate whose form is given by the boundaries \( x = 0, x = 1, y = 0 \) and \( y = x^3 \). Calculate the coordinates of the center of mass of the plate, if the density is given by \( \rho(x, y) = cxy^2 \), with \( c \) a constant.

4. Calculate \( \nabla \phi \) and \( (\nabla \cdot \nabla) \phi \), for \( \phi(x_1, x_2, x_3) = \sin x_1 + x_1^2 x_2 x_3 \).

5. Show that (use \( \epsilon_{ijk} \))

(a) \( \nabla \times (\nabla \times \vec{v}) = \nabla(\nabla \cdot \vec{v}) - \nabla^2 \vec{v} \)

(b) \( \nabla \cdot (\nabla \times \vec{v}) = 0 \)

for any smooth vector field \( \vec{v} \).