1. Find the mass of a wire of density \( \delta(x, y, z) = k z \) if it has the shape of the helix which is parameterized by \( x = 3 \cos t \), \( y = 3 \sin t \), and \( z = 4 t \), for \( 0 \leq t \leq \pi \).

2. Evaluate the line integral \( \int_{\mathbf{c}} (x^2 - y^2) \, dx + 2xy \, dy \), where \( \mathbf{c}(t) = (t^2, t^3) \) for \( 0 \leq t \leq 1 \).

3. Find the work done by the force field \( \mathbf{F}(x, y) = (x^3 - y^3) \mathbf{i} + xy^2 \mathbf{j} \) as it moves a particle along \( \mathbf{c}(t) = (t^2, t^3) \) for \( -1 \leq t \leq 0 \).

4. Calculate \( \int_{\mathbf{c}} y \, dx + x^2 \, dy \), where \( \mathbf{c} \) is the right angle curve from \((0, -1)\) to \((4, -1)\) to \((4, 3)\).

5. Find the work done by the force field

\[
\mathbf{F}(x, y) = -K \frac{x \mathbf{i} + y \mathbf{j} + z \mathbf{k}}{(x^2 + y^2 + z^2)^{3/2}} = \mathbf{\nabla}\left(\frac{K}{\sqrt{x^2 + y^2 + z^2}}\right)
\]

as it moves a particle along the straight line curve from \((0, 3, 0)\) to \((4, 3, 0)\).