1. Find \( \iiint_E y^2 z^2 \, dV \), where \( E \) is bounded by the paraboloid \( x = 1 - y^2 - z^2 \) and the plane \( x = 0 \).

2. Sketch the region of integration, reverse the order of integration and evaluate \( \int_0^4 \int_{\sqrt{y}}^2 \frac{y e^{x^2}}{x^3} \, dx \, dy \).

3. Consider a lamina that occupies the region \( D \) between the circles \( x^2 + y^2 = 1 \) and \( x^2 + y^2 = 4 \) in the first quadrant with mass density equal to the distance to \((0, 0)\). Find the mass and center of mass of the lamina.

4. Calculate \( \int_C y \, ds \), where \( C \) is the part of the graph \( y = 2x^3 \) from \((0, 0)\) to \((1, 2)\).

5. Find the work done by the force field \( \mathbf{F}(x, y) = \langle y, -x \rangle \) on a particle that moves along the graph of \( y = x^3 - x \) from \((-1, 0)\) to \((1, 0)\).

6. Which of the following vector fields are conservative? Find a potential for one of them and use it to calculate \( \int_C \mathbf{F} \cdot d\mathbf{r} \) where \( C \) is the arc of the unit circle from \((1, 0)\) to \((0, 1)\) in counterclockwise direction.

\[
\begin{align*}
\mathbf{F}_1(x, y) &= \langle x^2, x^2 \rangle \\
\mathbf{F}_2(x, y) &= \langle 2xy, x^2 \rangle \\
\mathbf{F}_3(x, y) &= \langle e^y, e^x \rangle \\
\mathbf{F}_4(x, y) &= \langle e^x, e^y \rangle
\end{align*}
\]

7. Use Green’s Theorem to evaluate \( \oint_C \sin(1 + x^2) \, dx + x(1 + y) \, dy \), where \( C \) is the unit circle.