1. Find the value of the line integral \[ \int (z + 2y) \, dx + (2x - z) \, dy + (x - y) \, dz \] along the line segment from \((0,0,0)\) to \((1,1,1)\).

2. Evaluate \[ \iint (x - 2y + z) \, dS \] where \(S: z = 10, \ x^2 + y^2 \leq 1\).
3. Evaluate $\int (yi + xj) \cdot dr$ for C: smooth curve from (0,0) to (3,8).

4. Evaluate $\int (x^2 + y^2 + z^2) ds$ for C: $r(t) = \sin t \mathbf{i} + \cos t \mathbf{j} + 8t \mathbf{k}$, $0 \leq t \leq \pi/2$
5. Use Green’s Theorem to evaluate the line integral \( \int (x^2 - y^2)dx + 2xydy \) for \( C: r = 1 + \cos \theta \)

6. Find the outward flux of \( F \) through the surface of the solid bounded by the graphs of the equations: \( F(x,y,z) = xyz \) for \( S: x^2 + y^2 = 9, z=0, z=4. \)
7. Determine whether the vector field is conservative. If it is, find the potential function for the vector field.
\[ \mathbf{F}(x,y,z) = 3x^2y^2z \mathbf{i} + 2x^3yz \mathbf{j} + x^3y^2 \mathbf{k} \]

8. Given \( \mathbf{F}(x,y,z) = xyz \mathbf{i} + y \mathbf{j} + z \mathbf{k} \),

   a. Find the divergence.

   b. Find the curl.