1. Evaluate \( \int \int_{R} \frac{x-y}{x+y} \, dA \), where \( R \) is the region with vertices (0, 2), (1, 1), (2, 2), and (1, 3).
2. Evaluate $\int_C xy\,dx + y\,dy$, $C$ is the sine curve $y = \sin x$, $0 \leq x \leq \pi/2$. 
3. \( \mathbf{F}(x, y, z) = e^y \mathbf{i} + (xe^y + e^z) \mathbf{j} + ye^z \mathbf{k} \),
(a): Show that \( \mathbf{F} \) is conservative,
(b): Evaluate \( \int_C \mathbf{F} \cdot d\mathbf{r} \), where \( C \) is the line segment from \((0, 2, 0)\) to \((4, 0, 3)\).
4. Evaluate $\int_C x^2y\,dx + \ln \sqrt{1 + y^2}\,dy$, where $C$ is the triangle from $(0, 0)$ to $(2, 2)$ to $(0, 2)$ to $(0, 0)$. 
5. Evaluate $\int_S \mathbf{F} \cdot \mathbf{n} dS$, where $\mathbf{F}(x, y, z) = x^2 \mathbf{i} + xy \mathbf{j} + z \mathbf{k}$ and $S$ is the part of the paraboloid $z = x^2 + y^2$ below the plane $z = 1$ with upward orientation.
6. Evaluate $\int_S \text{curl} \mathbf{F} \cdot \mathbf{n} \, dS$, where $\mathbf{F}(x, y, z) = x^2yz \mathbf{i} + yz^2 \mathbf{j} + z^3e^{xy} \mathbf{k}$. $S$ is the part of the sphere $x^2 + y^2 + z^2 = 5$ that lies above the plane $z = 1$, and $S$ is oriented upward.
7. Evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{F}(x, y, z) = xy\mathbf{i} + yz\mathbf{j} + zx\mathbf{k}$ and $C$ is the triangle with vertices $(1, 0, 0), (0, 1, 0),$ and $(0, 0, 1)$, oriented counterclockwise as viewed above.
8. Evaluate $\int \int_S \mathbf{F} \cdot \mathbf{n} \, dS$, where $\mathbf{F}(x, y, z) = x^3 \mathbf{i} + y^3 \mathbf{j} + z^3 \mathbf{k}$ and $S$ is the surface of the solid bounded by the cylinder $x^2 + y^2 = 1$ and the planes $z = 0$ and $z = 2$. 