1. Find the curl and div of $\mathbf{F} = (x^2y, yz^2, xz^2)$.

2. Find $f$ so that $\mathbf{F} = \nabla f$ and use it to find the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$. Here $\mathbf{F} = (2xz + \sin y, x \cos y, x^2)$ and $C$ is a curve from $(1, 0, 0)$ to $(1, 0, 2\pi)$.

3. Evaluate the line integral $\int_C x^2ydx - 3y^2dy$ using Green’s Theorem when $C$ is the curve which goes around the perimeter of the region $\{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq 1\}$ in the backwards (clockwise) direction.

4. Find the equation of the tangent plane to the parametric surface given by $\langle u^2, u^2 - v^2, v^2 \rangle$ at the point $(1, 0, 1)$.

5. Rewrite but do NOT evaluate the surface integral $\iint_S \mathbf{F} \cdot d\mathbf{S}$ as an usual double iterated integral (including limits of integration and a simplified integrand). Here $\mathbf{F} = (y, x, xy)$ and $S$ is the portion of the paraboloid $z = x^2 + 2y^2$ over the region $\{(x, y) : 1 \leq x \leq 2, \ln x \leq y \leq \pi\}$ Use the upward pointing normal of $S$.

6. Set up but do NOT evaluate a double iterated integral for the surface area of the surface $z = y^2 - x^2$ that lies between the cylinders $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$. The double iterated integral needs to have limits of integration and a simplified integrand.

7. Use cylindrical co-ordinates to evaluate $\iint_E x^2dV$ when $E$ is the solid within $x^2 + y^2 = 1$, above $z = 0$ and below $z^2 = 4x^2 + 4y^2$.

8. Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ if $\mathbf{F} = (x^2y, -xy)$, and $\mathbf{r}(t) = (t^3, t^4), 0 \leq t \leq 1$.

9. Use the given transformation to evaluate $\int \int_R x dA$ where $R$ is the region in the FIRST quadrant where $9x^2 + 4y^2 \leq 36$ and the transformation is $x = 2u, y = 3v$. Also explicitly draw $R$ and $S$, the region in the uv plane that maps to $R$ in the xy plane by this transformation. Clearly label the Jacobian of the transformation.

10. Rewrite the the limits of $\int_0^1 \int_0^1 \int_0^1 f(x, y, z)dxdydz$ in the orders $dxdydz$ and $dxdzdy$.