Review Practice: Chapters 16

1. Find the equation and parametric equations of the tangent plane at $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, -2\right)$ to the parametric surface S: $\mathbf{r}(u, v) = \langle v\cos u, v\sin u, 2v\rangle$ for $-2 < v < 2$ and $0 < u < \pi$.

2. Find a parametrization of the surface given by:

$$3x + x^2 + 2y^2 - z^2 = 3 \quad \text{for} \quad z \leq 0$$

3. Consider $\mathbf{F} = \langle xye^z, yze^x, xze^y\rangle$

   (a) Compute Div $\mathbf{F}$

   (b) Compute Curl $\mathbf{F}$

   (c) Is $\mathbf{F}$ conservative? Why or why not.

4. $\mathbf{F} = \langle y, x\cos z, -xy\sin z\rangle$ find $\int_C \mathbf{F} \cdot d\mathbf{r}$ for any curve with initial point $(0, 0, 0)$ and terminal point $(1, 1, 0)$.

5. Set up only: $\int\int_S xy\ dS$ over D, where S is part of the graph of $z^2 = 4x^2 + 4y^2$ between the planes $z = -2$ and $z = -4$ and D is the region for your parameters.

6. Use Stoke's Theorem to compute: $\int\int_S \text{Curl } \mathbf{F} \cdot d$ where $\mathbf{F} = \langle y, -x, z^2 \rangle$ and S is part of $z = -x^2 - y^2$ above $z = -4$.

7. Use the divergence theorem to compute: $\int\int_S \mathbf{F} \cdot d$ where $\mathbf{F} = \langle zy, 2y, 3z \rangle$ and S is the surface of the solid right cone $z = x^2 + y^2$ for $0 \leq z \leq 2$.