Math 2X03 - Homework 5

Due: June 7, 2018 (by 10:00 pm)

(The following problems are from the textbook.)

1. (§16.6 #36) Find an equation of the tangent plane to the parametric surface

$$\vec{r}(u, v) = (\sin u, \cos u \sin v, \sin v)$$

at the point $\vec{r}(\frac{\pi}{6}, \frac{\pi}{6})$.

2. (§16.7 #8) Evaluate the surface integral $\iint_S (x^2 + y^2) dS$, where S is the surface with vector equation $\vec{r}(u, v) = (2uv, u^2 - v^2, u^2 + v^2)$, $u^2 + v^2 \leq 1$.

3. (§16.7 #24) Evaluate the surface integral $\iint_S \vec{F} \cdot d\vec{S}$, where $\vec{F}(x, y, z) = (-x, -y, z^3)$, and S is the part of the cone $z = \sqrt{x^2 + y^2}$ between the planes $z = 1$ and $z = 3$ with downward orientation.

4. (§16.8 #2) Use Stokes' Theorem to evaluate $\iint_S \text{curl}\vec{F} \cdot d\vec{S}$, where $\vec{F}(x, y, z) = (x^2 \sin z, y^2, xy)$, and S is the part of the paraboloid $z = 1 - x^2 - y^2$ that lies above the xy-plane, oriented upward.

5. (§16.8 #8) Use Stokes' Theorem to evaluate $\int_C \vec{F} \cdot d\vec{r}$, where $\vec{F}(x, y, z) = (1, x + yz, xy - \sqrt{z})$, and C is the boundary of the part of the plane $3x + 2y + z = 1$ in the first octant, oriented counterclockwise as viewed from above.