Quiz 4 **Name:**
You have 30 minutes **Banner#:**

1. Let $F(x, y, z) = (z^2x, \frac{1}{3}y^3 + \tan z, x^2z + y^2)$.

   (a) Use the divergence theorem to compute the flux $\int_S F \cdot \hat{n}\ dS$ where S is surface of a unit sphere $x^2 + y^2 + z^2 = 1$, and $\hat{n}$ is outwards-pointing unit normal.

   (b) Let S_1 be the unit disk in the xy plane given by $\{x^2 + y^2 \leq 1,\ z = 0\}$. Compute the flux of F through S_1, assuming the unit normal is pointing up.

   (c) Compute the flux $\int_{S_2} F \cdot \hat{n}\ dS$ where S_2 is the top half of the unit sphere, $\{x^2 + y^2 + z^2 = 1,\ \ z \geq 0\}$, assuming the unit normal is pointing up.

2. Let C be a simple closed curve that lies in the plane $x + y + z = 1$ and whose area is 1. Use Stokes Theorem to find the line integral $\int_C zdx - 2xdy + 3ydz$.