Your Name:_____ Signature:_____

TA Name:_____ Drill Time:_____

Quiz 10 (Take Home)

Math 2574: Calculus III

Due: Submit via Gradescope by Thursday, 4/30/20

Instructions: CLEARLY SHOW ALL YOUR WORK. Put a **box** around your final answer.

This quiz is due by **Tuesday, April 21.** You will submit your work via Gradescope. Remember, the *process and techniques* for finding the right answer are typically more important than the answer itself.

1. **[4 points]** Let S be the portion of the plane $z = 8 - x - 2y$ that lies in the first octant. Evaluate the surface integral

$$\iint_S e^z \, dS.$$

2. **[4 points]** Let S be the portion of the surface $z = \cos y$ with $0 \leq x \leq 4$ and $-\pi \leq y \leq \pi$. Find the flux of $\vec{F} = \langle e^{-y}, 2z, xy \rangle$ through S:

$$\iint_S \vec{F} \cdot \vec{n} \, dS.$$

3. **[4 points]** Let $\vec{F} = \langle 2z, -4x, 3y \rangle$ and let S be the portion of the sphere $x^2 + y^2 + z^2 = 169$ that lies above the plane $z = 12$. Use any results you wish to compute

$$\iint_S (\nabla \times \vec{F}) \cdot \vec{n} \, dS.$$

4. **[4 points]** Let $\vec{F} = \langle x^2 - z^2, y, 2xz \rangle$ and let C be the triangle in $\mathbb{R}^3$ with vertices $(4,0,0), (0,4,0), (0,0,4)$, oriented counterclockwise. Use any results you wish to compute

$$\oint_C \vec{F} \cdot d\vec{r}.$$

5. **[4 points]** Let S be the boundary of the solid region in the first octant that lies between the planes $z = 4-x-y$ and $z = 2 - x - y$; S has five "sides". Let $\vec{F} = \langle x^2, -y^2, z^2 \rangle$. Use any results you wish to compute the flux of $\vec{F}$ through S:

$$\iint_S \vec{F} \cdot \vec{n} \, dS.$$