Your Name:_____ Signature:_____

TA Name:_____ Drill Time:_____

Quiz 9 (Take Home)

Math 2574: Calculus III

Due: Submit via Gradescope by Tuesday, 4/21/20

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. This quiz (like earlier ones) will be graded on a 0-1-2 scale. Remember, the *process and techniques* for finding the right answer are typically more important than the answer itself.

1. Let $\vec{F}(x, y) = \langle y - x, -x \rangle$ and let C be the circle of radius two centered at the origin. Use Green's Theorem to find the circulation of $\vec{F}$ on the curve C.

2. Now find the outward flux of $\vec{F}$ across the curve C by again using Green's Theorem.

3. Determine whether or not the vector field

$$\mathbf{F} = \langle e^{-x}\cos y + yz + 3x^2 z\ ,\ e^{-x}\sin y + xz + \frac{1}{y}\ ,\ xy + 3z^2 + x^3 \rangle$$

is conservative; explain your reasoning. If it is conservative, find a potential function for the vector field.

4. Let $\mathbf{F} = \langle x^2 y,\ xyz,\ y\sin x \rangle$ be a vector field in $\mathbb{R}^3$.

   (a) Find the divergence of $\mathbf{F}$.

   (b) Find the curl of $\mathbf{F}$.