MATH 259 – QUIZ 8 – SPRING 2019 || 25 POINTS || 20 MINUTES

Instructions: Show all work. No collaboration or references. No computational devices allowed without instructor permission.	Print Name ______________________

1. (5 pts) Calculate the curl and divergence of $\mathbf{F} = \langle x - y, zy, x + y \rangle$.

2. (5 pts) Calculate the flux of $\mathbf{F} = \langle 3x, 2y, z \rangle$ through the surface $x + \frac{y}{2} + \frac{z}{2} = 1$, $x \geq 0$, $y \geq 0$, $z \geq 0$ oriented with upward normals.

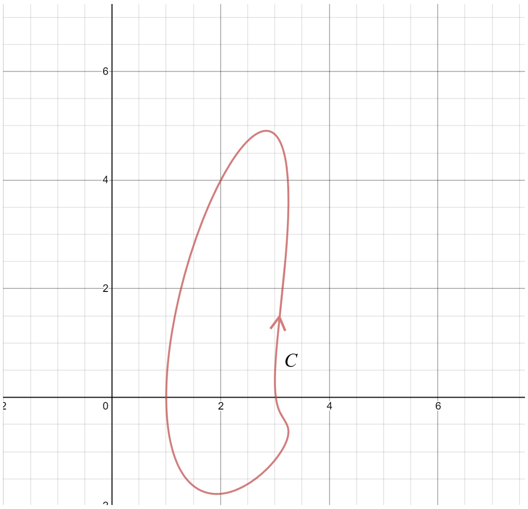
3. (5 pts) Use Green's theorem to calculate $\oint_{\partial R} \mathbf{F} \cdot d\mathbf{r}$ for $\mathbf{F} = \langle -y, x + y \rangle$ and $R = [0, 2] \times [0, 1]$.

4. (5 pts) Calculate:

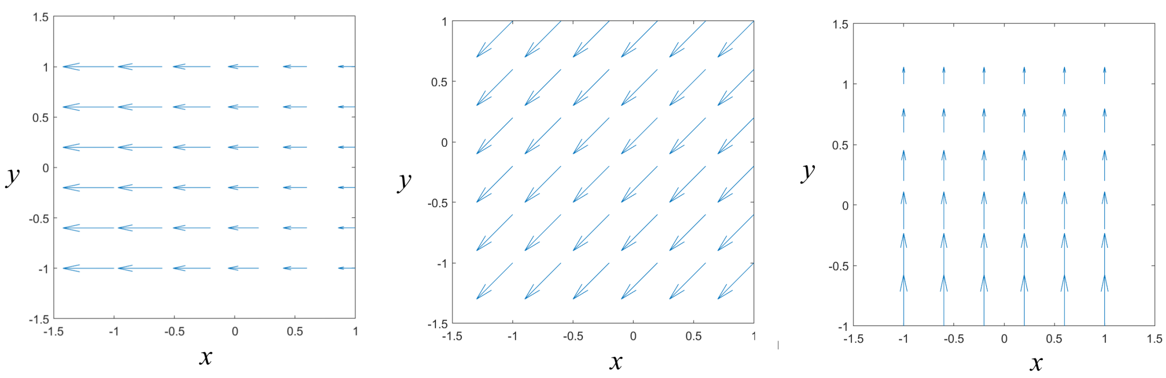
   a) $\oint_C \mathbf{F} \cdot d\mathbf{r}$ for $\mathbf{F} = \langle 2x + y, 3y^2 + x \rangle$ and

   b) $\oint_C \mathbf{G} \cdot \mathbf{n}\, ds$ for $\mathbf{G} = \langle x^2 + y, -2xy \rangle$

   where C is the curve shown in the figure below.



5. (5 pts) Label the vector fields in the figures below as having negative, zero, or positive divergence.



6. (5 pts) Calculate the surface area of the right-circular cone with height and base radius both equal to 5 (with open base, so just the conical shell). Also find both inward and outward normal vectors.

7. (5 pts) Evaluate both $\iint_S f dS$ and $\iint_S \mathbf{F} \cdot d\mathbf{S}$ for S the sphere centered at the origin with radius 1 and $f(x, y, z) = x + y + z$ and $\mathbf{F}(x, y, z) = \langle x, yz, xy \rangle$.