

Math 3298 Worksheet 18: Green's Theorem and curl.

Group members (1 to 3): _____

- (1) Use Green's theorem ($\oint_C \vec{F} \cdot d\vec{r} = \int \int_R (\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}) dA$, where $\vec{F} = (P, Q)$) to evaluate the following integral:

$$\oint_C x e^{2x} dx - 3x^2 y dy$$

where C is the quarter unit circle in the positive quadrant (i.e. the line segment from $(0, 1)$ to $(0, 0)$, the line segment from $(0, 0)$ to $(1, 0)$, and the arc of the unit circle from $(1, 0)$ to $(0, 1)$).

- (2) Construct a vector field \vec{G} such that $\text{curl}(\vec{G}) = (1, 0, 0)$ and each component of \vec{G} is non-constant.