

Name:

Section (circle one): 10-11 11-12

1. Let $D = \{(x, y) \in \mathbb{R}^2 \mid x^2 + y^2 \leq 1\}$ and $f(x, y) = 3x^2 + y^2 + \sqrt{x^2 + y^2} + \frac{y^2}{\sqrt{x^2 + y^2}}$. Compute $\iint_D f(x, y) \, dA$. [Hint: Let $P = -y\sqrt{x^2 + y^2}$ and $Q = x(x^2 + y^2)$. Figure out what $\frac{\partial Q}{\partial x}$ and $\frac{\partial P}{\partial y}$ are.]

2. Find the curl and divergence of the vector field $\mathbf{F}(x, y, z) = \langle xe^{-y}, xz - e^y + e^{-y}, ze^y \rangle$. Please clearly label both answers.