

Name:

1. The following vector field is conservative:

$$\mathbf{F} = \langle ye^z, xe^z - z, xye^z - y \rangle$$

- a) Find a potential function for \mathbf{F} .

- b) Doing very little work, compute $\int_C \mathbf{F} \cdot d\mathbf{R}$ where C is the straight line from the point $\langle 1, 1, 0 \rangle$ to the point $\langle 0, 1, 2 \rangle$.

2. Recall that Green's Theorem states that for any curve C traversing the boundary (counterclockwise) of a simply connected region \mathcal{D}

$$\int_C P dx + Q dy = \iint_{\mathcal{D}} \left(-\frac{\partial P}{\partial y} + \frac{\partial Q}{\partial x} \right) dA.$$

Use Green's theorem to compute the line integral $\int_C xy dx + (x - y) dy$ where C is the boundary of the region lying between the line $y = 0$ and the graph of $y = 4 - x^2$, oriented counterclockwise. For full credit, your solution must employ Green's Theorem.

