

Name:

1. A piece of wire is parameterized by $\mathbf{r}(t) = \langle \cos(t), \sin(t), t \rangle$ for $0 \leq t \leq 2\pi$ and with density $\delta = z^2$. Compute the mass of the wire.

2. The vector field $\mathbf{F} = \langle 3x^2y - y, 2y + x^3 - x \rangle$ is conservative. Find a potential for it.

3. Compute the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle xy, x \rangle$ and where C is the portion of the curve $y = x^2$ with $-1 \leq x \leq 1$.