Name_____

Consider the conservative vector field

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

Use the Fundamental Theorem of Line Integrals to evaluate

$$\int_C \mathbf{F} \cdot d\mathbf{r},$$

where C is a smooth, oriented curve from (-1, 1, 0) to $(2, 2, 3)$.

Solution
A potential function for $\mathbf{F}$ is $\varphi(x, y, z) = xye^z$. By the Fundamental Theorem of Line Integrals,

$$\int_C \mathbf{F} \cdot d\mathbf{r} = \varphi(2, 2, 3) - \varphi(\text{-}1, 1, 0) = 4e^3 + 1.$$