1. Let \( c(t) = (3\sin(t), 4t, 3\cos(t)) \) be a curve, over the range \( 0 \leq t \leq 2\pi \). For the vector field \( \vec{F}(x, y, z) = (z, x^2 + y^2, 1) \) and the function \( f(x, y, z) = y^2 + z^2 \), compute

\[
\int_{c(t)} \vec{F} \cdot d\vec{s} \quad \text{and} \quad \int_{c(t)} f \, ds
\]
2. Determine if the vector field \( \vec{F} = (2xyz + yze^{xy}, x^2 + xze^{xy} + 2y, x^2y + e^{xy}) \) is conservative, and if so, find a potential function for \( \vec{F} \).