Math 13 Worksheet #11: Fundamental Thm for Line Integrals

For the following problems, use the Fundamental Thm for line integrals, if applicable, to evaluate $\int_C \boldsymbol{F} \cdot d\boldsymbol{r}$. Otherwise show that the vector field is not conservative.

(1) $\boldsymbol{F}(x, y, z) = < -z, 1, x >$ with C a circular helix given by $x = \cos t$, $y = t$, and $z = \sin t$, for $0 \leq t \leq 2\pi$.

(2) $\boldsymbol{F}(x, y, z) = < yz^{xy} \ln z, xz^{xy} \ln z, \frac{xyz^{xy}}{z} >$ with C any curve from $(0, 0, 1)$ to $(2, 16, 3)$.

(3) $\boldsymbol{F}(x, y, z) = < yze^{xyz} + 2, xze^{xyz} - 1, xye^{xyz} >$ and C is the curve of intersection of the surface $z = \sqrt{x^2 + y^2}$ and the plane $z - x + y = 10$.