Let $\vec{\mathbf{r}}(t) = < t\cos(t), t\sin(t), t >$.

1. Find the integral that gives the arclength of $\vec{\mathbf{r}}(t)$ for $-4\pi \leq t \leq 4\pi$. Simplify it as much as possible.
2. The equation $z^2 = x^2 + y^2$ defines a surface in 3-space - every point on the surface satisfies this equation. Show that the graph of $\vec{\mathbf{r}}(t)$ lies on this surface.