1. Describe the given set in cylindrical coordinates and in spherical coordinates.

\[ x^2 + y^2 + z^2 \leq 4, \quad x \geq y, \quad z \geq 0 \]

2. Parameterize the intersection of the surfaces \( x^2 + z^2 = 4 \) and \( z = y^3 \).

3. Find a parameterization of the tangent line to \( \mathbf{r}(t) = \langle t^2, \cos \pi t, e^{1-t} \rangle \) at \( t = 1 \).

4. Find the length of the curve \( \mathbf{r}(t) = \langle \cos 3t, 2t^{3/2}, \sin 3t \rangle \) over the interval \( 0 \leq t \leq 2\pi \).