Solve the problems in the space provided below.

1) Find the total arclength of the parametrized curve in $\mathbb{R}^3$

$$\gamma(t) = (e^t \sin t, \ e^t \cos t, \ \sqrt{2}e^t),$$

with $0 \leq t \leq 2\pi$.

There is another problem overleaf.
2) Imagine that the Earth is the unit sphere in \( \mathbb{R}^3 \) centered at the origin. An asteroid is approaching from the point \((0, 4, 3)\) along the path
\[
\gamma(t) = ((4 - t) \sin t, (4 - t) \cos t, 3 - t),
\]
starting at \( t = 0 \).

(a) Find when and where it will first hit the Earth.

(b) What speed will it have at the impact?