1. (a)

$$T(1) = \langle \frac{4}{\sqrt{257}}, \frac{15}{\sqrt{257}}, \frac{4}{\sqrt{257}} \rangle$$

   (b) One solutions is
$$x = 4 + 4t, y = 5 + 15t, z = 2 + 4t$$

2. No. Basically you can show that if there was an intersection, it would occur when $\sin\theta = 1$. However, there is no point on the curve where $\sin\theta = 1$, so there is no intersection.

3. (a)

$$a_T = \frac{2}{\sqrt{6}}$$

   (b)

$$t = \pm 2^{-1/6}$$

4. You can show that
$$\kappa = \frac{10}{(8t^2 - 4t + 13)^{3/2}}$$

   This is maximal when $8t^2 - 4t + 13$ is minimal, i.e., at $t = 1/4$.

5. (a) The region above the line $y = -x$ (the line itself is not included).

   (b) $f_{xy}(x, y) = e^y + \frac{1}{(x+y)^2}$.