Introduction to Differential Geometry

Spring 2013

[1] Consider the parametrized curve

$$\alpha(t) = (2\cos t, 2t, 3\sin t)$$

in the 3-dimensional Euclidean space $\mathbb{R}^3$. Find all the points at which the curvature takes its maximum.

[2] Assume that an arc-length parametrized smooth curve, say γ, is on the unit sphere. Show that the curvature of γ cannot be zero anywhere.

[3] Let M be the surface in $\mathbb{R}^3$ given by the equation

$$x^2 + y^2 + z^8 = 1.$$

Do there exist points at which the Gauss curvature of M is equal to zero? If so, find at least one of them. (You need not find all of them).