Exam-Differential Geometry

10th Nov. 2018

(1) Compute the curvature of the unit speed curve

$$\alpha(t) = (3\cos\frac{t}{5}, 3\sin\frac{t}{5}, \frac{4}{5}t).$$

(2) Let M be the surface given by $x^2 + y^2 - z^2 = 1$ in $\mathbb{R}^3$. Find at least two geodesics on M.

(3) Consider the surface defined by

$$xy = z$$

in $\mathbb{R}^3$. Find the Gaussian curvature and the mean curvature at a point $P = (u, v, uv)$.