Differential Geometry of Curves and Surfaces (MTH-406)

Surprise quiz-1, (22/02/2017)

Time: 50 minutes Maximum Marks: 10

Marks for each questions are given right side.

Problem 1. Let $S \subset \mathbb{R}^3$ be a smooth surface with Gaussian curvature $K > 0$. Let $C \subset S$ be a regular curve. Let κ_1, κ_2 be the principal curvatures of S at p. Let κ be the curvature of the curve C at p. Is it true that the curvature κ of the curve C at p satisfies $\kappa \geq min(|\kappa_1|, |\kappa_2|)$? (2)

Problem 2. Compute the Gauss curvature and principal curvature of the surface

$$S = \{(x, y, z) \in \mathbb{R}^3 | x^2/a^2 + y^2/b^2 + z^2/c^2 = 1\}$$

(5)

Problem 3. Show that the Gaussian and mean curvatures of a smooth surface S are smooth functions on S. (3)