

Assignment - 3

Curves AND surfaces

August 02, 2016

Total Marks: 30

1. Show that applying a rigid motion in \mathbb{R}^3 does not change its First Fundamental Form. [5]

2. A Surface S is called *tangent developables* if it is union of tangent lines to unit speed smoothcurve γ on \mathbb{R}^3 (tangent lines are straight lines parallel to $\dot{\gamma}(u)$ at all points $\gamma(u)$).

(a) Find a parametrization of S . [3]

(b) Find necessary condition for S to be a regular . [4]

(c) Calculate the First Fundamental Form of S . [3]

(d) Show that S is isometric to part of a plane. [5]

3. Show that the circular cone $\sigma(u, v) = (u \cos v, u \sin v, u)$, $u > 0, 0 < v < 2\pi$ is isometric to part of xy -plane. [5]

4. Let σ be the ruled surface

$$\sigma(u, v) = \gamma(u) + v\delta(u),$$

where γ is uni speed curve in \mathbb{R}^3 and $\delta(u)$ is a unit vector for all u . Find necessary and sufficient condition for σ to be conformal. [5].