## DIFFERENTIAL GEOMETRY OF CURVES AND SURFACES (MTH 406) ASSIGMENT-1

### Submission date: 14-01-2020

**Problem-A.** Submit an answer of all problems.

(1) Let $f : (\alpha, \beta) \to \mathbb{R}$ be an one-one differentiable function whose derivation at any point is nonzero. Let $\phi$ be an inverse of $f$ defined on the image of $f$. Show that $Image(f)$ is an open intervel and $\phi$ is a differentiable funtion. Compute the derivation of $\phi$ at any point in term of derivation of $f$.

(2) Show that a parametrised curve has a unit-speed reparametrization if and only if it is regular.

(3) Solve 1.2.3, 1.2.4, 1.3.1, 1.3.3, 1.3.3, from Chapter 1.

**Problem:B.** You don't need submit it.

(1) Let $f : \mathbb{R} \to \mathbb{R}$ such that $f(x) = x^3$. Show that $f$ is a smooth function and its inverse is continuous on $\mathbb{R}$, but not differentiable at $x = 0$.

(2) Show that any reparametrization of a regular curve is regular.

(3) Show that the arc length function of a regular parametrized curve is smooth.

(4) Show by an example that a level curve may have regular and nonregular parametrization.

(5) Solve 1.1.2, 1.1.3, 1.1.7, 1.1.8, 1.4.6 from Chapter 1.

**Text Book:** Elementry Differential Geometry, Andrew Pressley 2nd edition

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*Date*: 08-01-2020.