

Differential Geometry of Curves and Surfaces

Homework 13

Due on January 5

1. **Enneper's surface** is the image of the parameterization $\mathbf{g} : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ defined by

$$\mathbf{g}(u, v) = \left(u + uv^2 - \frac{1}{3}u^3, -v - u^2v + \frac{1}{3}v^3, u^2 - v^2 \right).$$

- (a) Show that the first fundamental form is

$$\mathbf{I} = (1 + u^2 + v^2)^2 (du^2 + dv^2)$$

(so this parameterization is by isothermal coordinates).

- (b) Show that Enneper's surface is a minimal surface.
(c) Compute the Gauss curvature of this surface.