

Chapter 4, Section 1. Exercises 1, 2, 3 and 5

MTH 594, Prof. Mikael Vejdemo-Johansson
Differential Geometry Independent Study

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Exercise 4.1.2

Define surface patches $\sigma_{\pm}^x : U \rightarrow \mathbb{R}^3$ for S^2 by solving the equation $x^2 + y^2 + z^2 = 1$ for x in terms of y and z :

$$\sigma_{\pm}^x(u, v) = (\pm\sqrt{1 - u^2 - v^2}, u, v)$$

defined on the open set $U = \{(u, v) \in \mathbb{R}^2 \mid u^2 + v^2 < 1\}$. Define σ_{\pm}^y and σ_{\pm}^z similarly (with the same U) by solving for y and z , respectively. Show that these six patches give S^2 the structure of a surface.
