

Surfaces
Math 473
Introduction to Differential Geometry
Lecture 19

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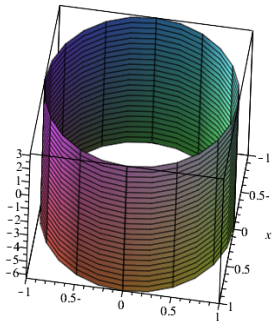
Examples

Example(1)

Let the surface patch $X : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ given by

$$X(u, v) = (\cos u, \sin u, v).$$

Show that this determines a regular surface patch. Can you describe this surface geometrically?

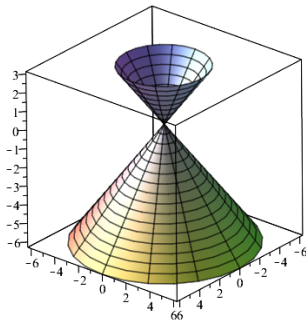


Example(2)

Consider the surface patch $X : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ given by

$$X(u, v) = (v \cos u, v \sin u, v).$$

Determine whether X is regular surface patch? Can you describe this surface geometrically?

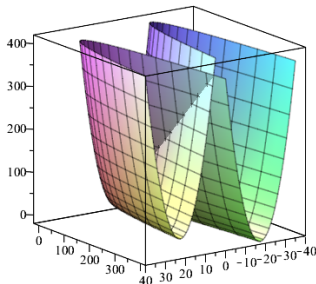


Example(3)

Consider the surface patch $X : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ given by

$$X(u, v) = (u + v, u + v^2, u^2 + v).$$

Determine whether X is regular surface patch?



Example(4) Let $U = \{(u, v) \in \mathbb{R}^2 : u^2 + v^2 < 1\}$. Consider the surface patch $X : U \rightarrow \mathbb{R}^3$ given by

$$X(u, v) = (u, v, \sqrt{1 - u^2 - v^2}).$$

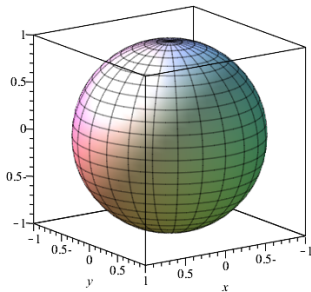
Determine whether X is regular surface patch? Can you describe this surface geometrically?

Problem(1)

Consider the surface patch $X : (-\pi, \pi) \times (-\frac{\pi}{2}, \frac{\pi}{2}) \rightarrow \mathbb{R}^3$ given by

$$X(u, v) = (\cos v \cos u, \cos v \sin u, \sin v).$$

Determine whether X is regular surface patch?



Thanks for listening.