

Surfaces  
Math 473  
Introduction to Differential Geometry  
Lecture 17

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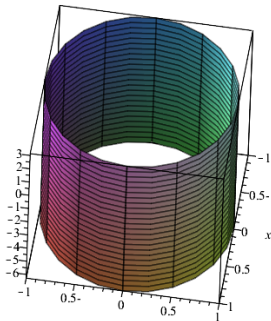
# Examples

## 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?



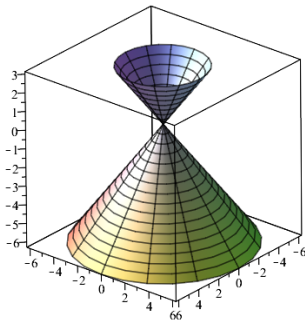
# Examples

## 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?

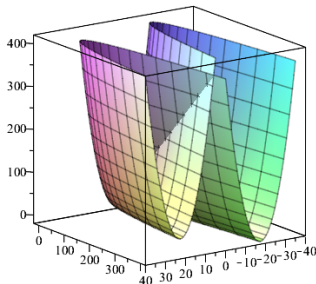


## Example(3)

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?

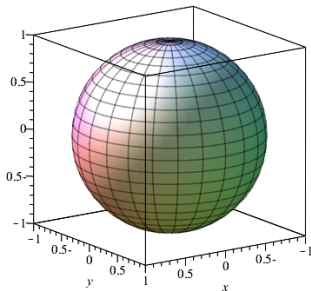
# Problem

## 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.*