3D Surface Plot and Curve Type Identification in R

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Question

Write an R program that uses the data of a surface (3D plot) to visualize it and determine the type of the curve.

Problem Description

A surface is given by the equation:

$$z = x^2 - y^2$$

Your program should:

1. Plot the 3D surface using the `plotly` library.
2. Identify the type of curve (e.g., hyperbolic, parabolic, cylindrical, etc.).

Requirements

1. **Define the ranges**:
   - x and y should range from $[-3, 3]$, with 50 equally spaced points in each direction.
2. **Visualization**:
   - Use the `plotly` library to create an interactive 3D plot of the surface.
3. **Curve Analysis**:
   - Analyze the given surface equation $z = x^2 - y^2$ and determine its type.

Expected Output

1. **3D Plot**:
    - An interactive 3D plot visualizing the surface.
2. **Curve Type Identification**:

Notes

- Use mesh grids for creating the x, y, z values.
- Ensure comments are added in the code for clarity.

Hints for Implementation

- Use `plot_ly` to create the surface plot.
- For defining the grid, use `expand.grid` in R.
- Add annotations or labels to the plot for better interpretation if needed.