Creating Graphs Using LaTex

2D/3D Graphs

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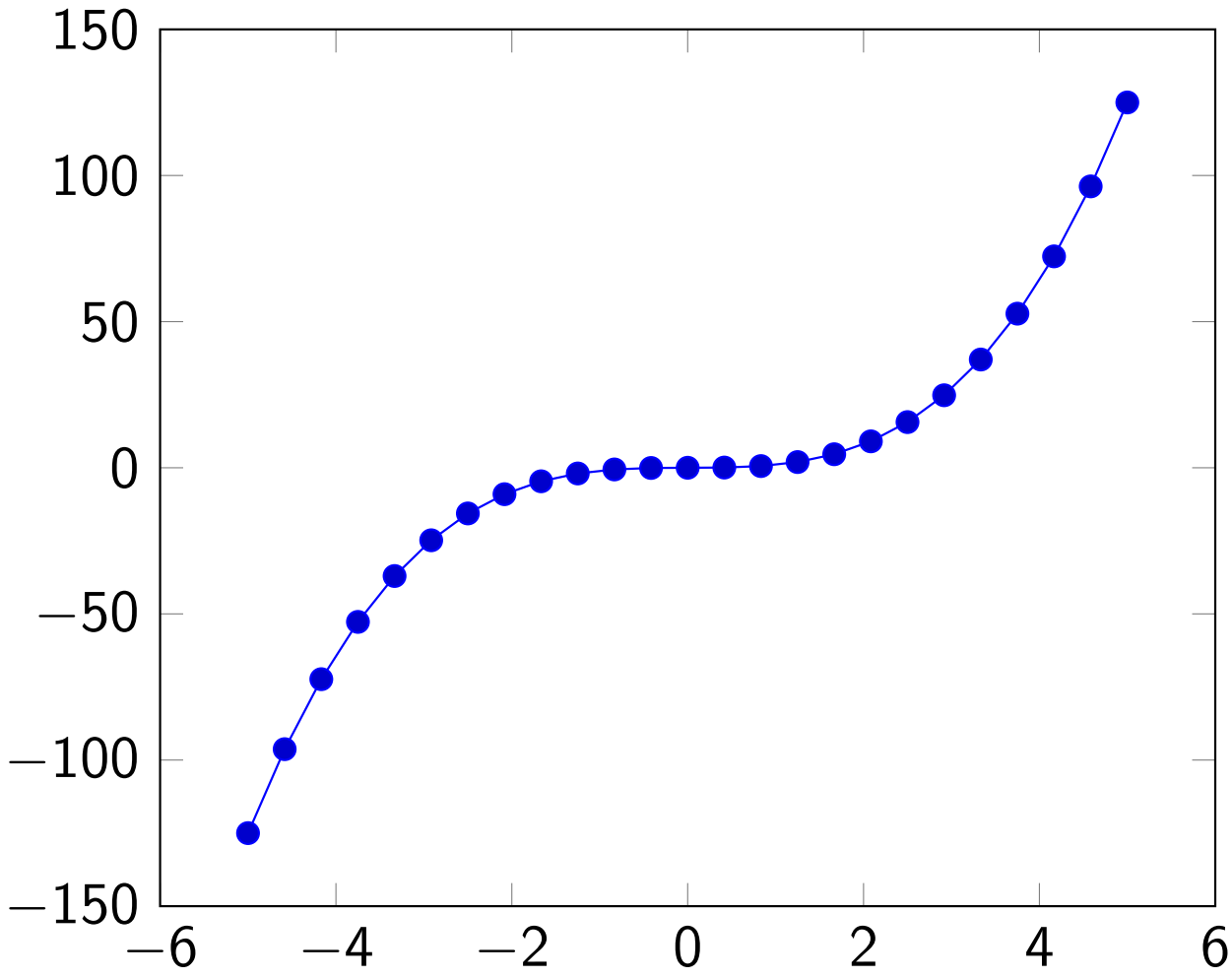
Steps in Creating 2D Graphs



Simple Graph

- Code for creating a simple 2D graph

```
\begin{tikzpicture}
    \begin{axis}
    \addplot {x^3};
    \end{axis}
\end{tikzpicture}
```

How to Edit the Color of the Line

- Can be changed to any color of desire

```
\usepackage{pgfplots}


\begin{tikzpicture}
    \begin{axis}
    \addplot[color=red] {x^3};
    \end{axis}
\end{tikzpicture}
```

How to Edit the Type of Line

- Other types of lines such as (thick, dotted, dash-dot, dash-dot-dot)

```
\usepackage{pgfplots}


\begin{tikzpicture}
    \begin{axis}
    \addplot[dashed] {x^3};
    \end{axis}
\end{tikzpicture}
```

How to Edit the Type of Mark

- Other ways to change the mark such as o(blank circle), square, triangle, diamond, +(plus), -(minus), x, star

```
\usepackage{pgfplots}


\begin{tikzpicture}
    \begin{axis}
    \addplot[mark=*] {x^3};
    \end{axis}
\end{tikzpicture}
```

How to Edit the Number of Dots

- Any number of dots can be used to graph your line

```
\usepackage{pgfplots}


\begin{tikzpicture}
    \begin{axis}
    \addplot[ samples=10] {x^3};
    \end{axis}
\end{tikzpicture}
```

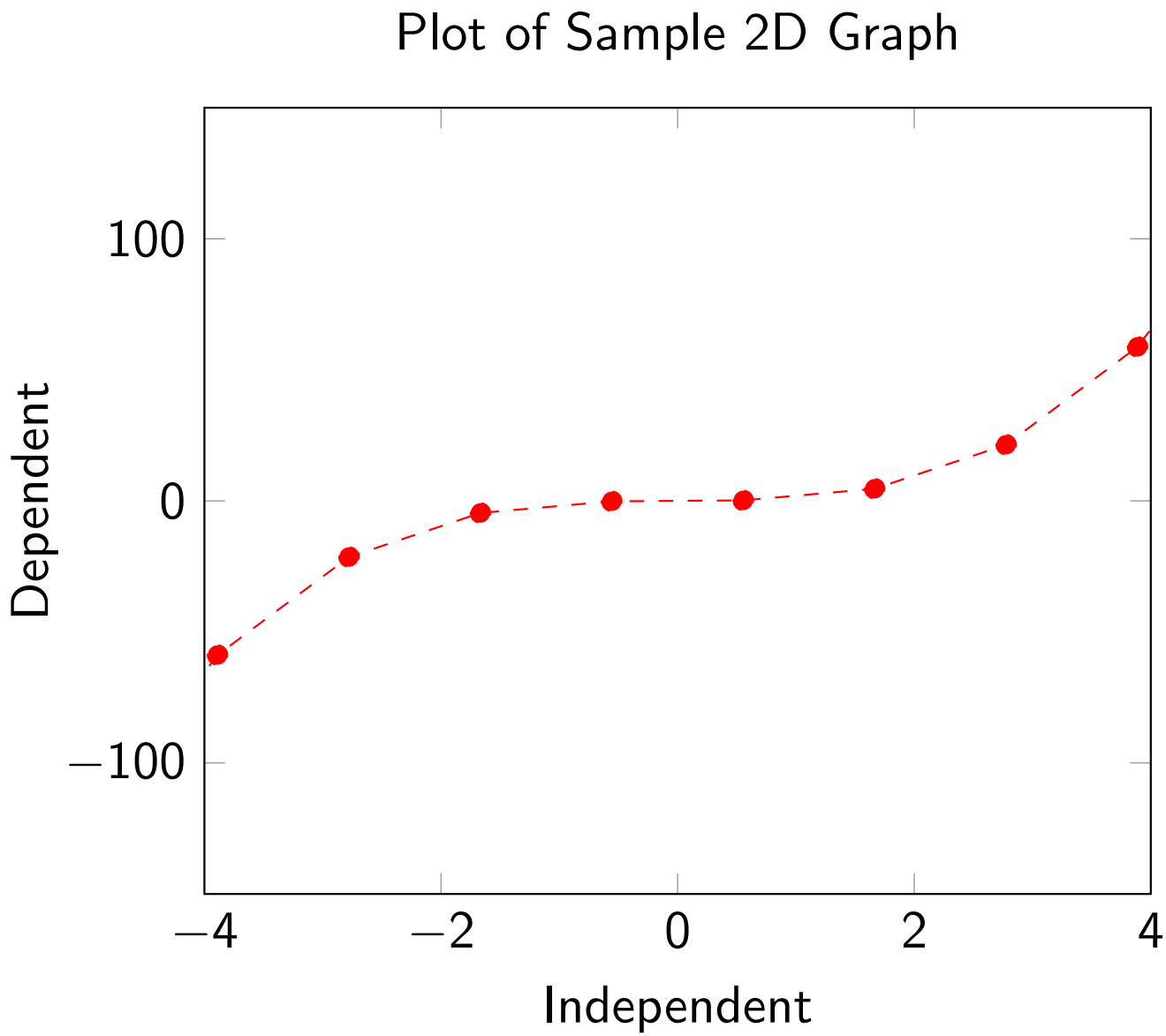
How to Edit the Titles and Margins

- You can edit the title and margins to be anything you want

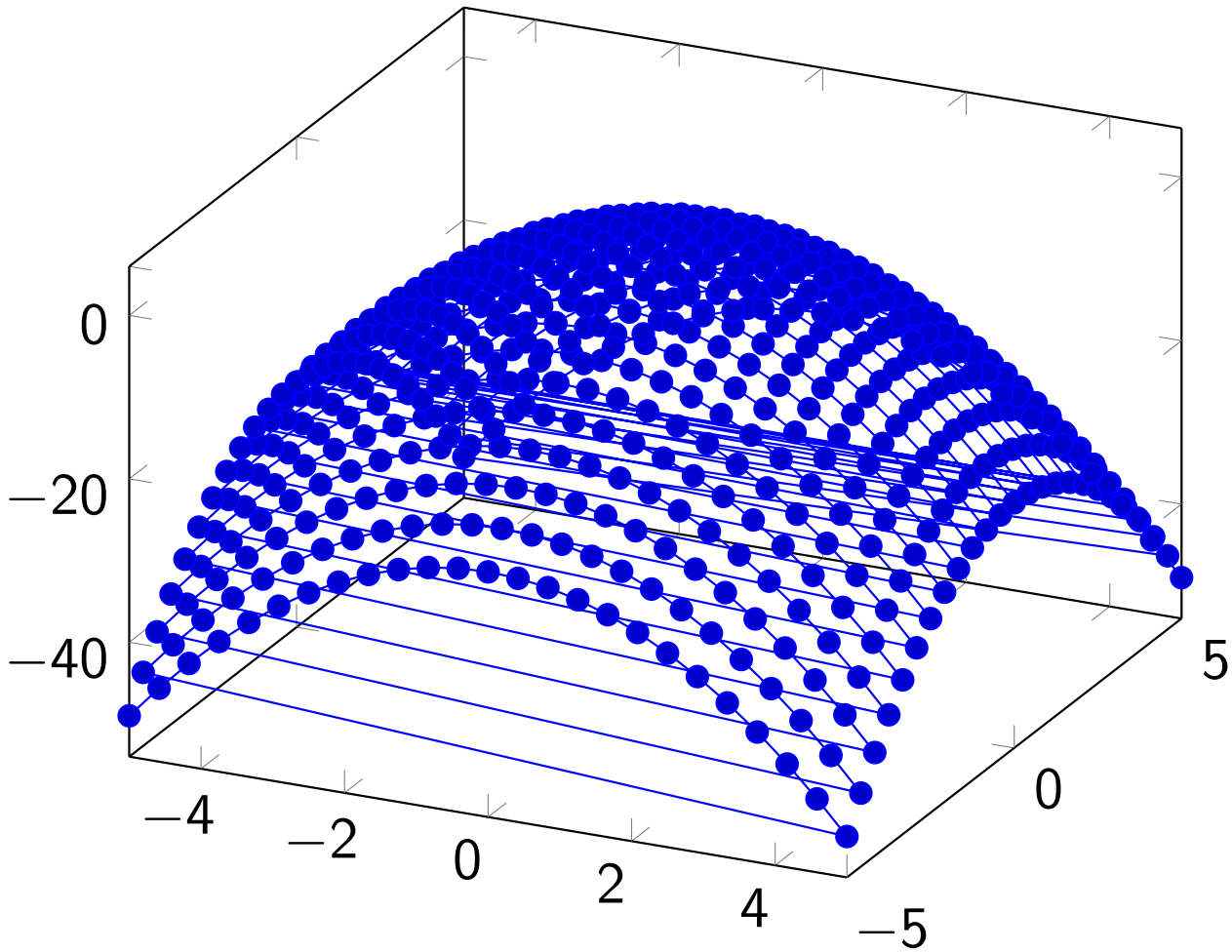
```
\usepackage{pgfplots}


\begin{tikzpicture}
    \begin{axis}[
      xmin=-4, xmax=4, ymin=-150, ymax=150,
      xlabel={Independent}, % X-axis label
      ylabel={Dependent}, % Y-axis label
      title={Plot of Sample 2D Graph}, % Plot title
    ]
    \addplot {x^2};
    \end{axis}
\end{tikzpicture}
```

Combination of All Edits



Simple 3D Graph



Simple 3D Graph Code

- Code for creating a simple 3D graph
- 3D Graph: "addplot3"

```
\usepackage{pgfplots}


 \begin{tikzpicture}
    \begin{axis}
    \addplot3{1-x^2-y^2};
    \end{axis}
\end{tikzpicture}
```

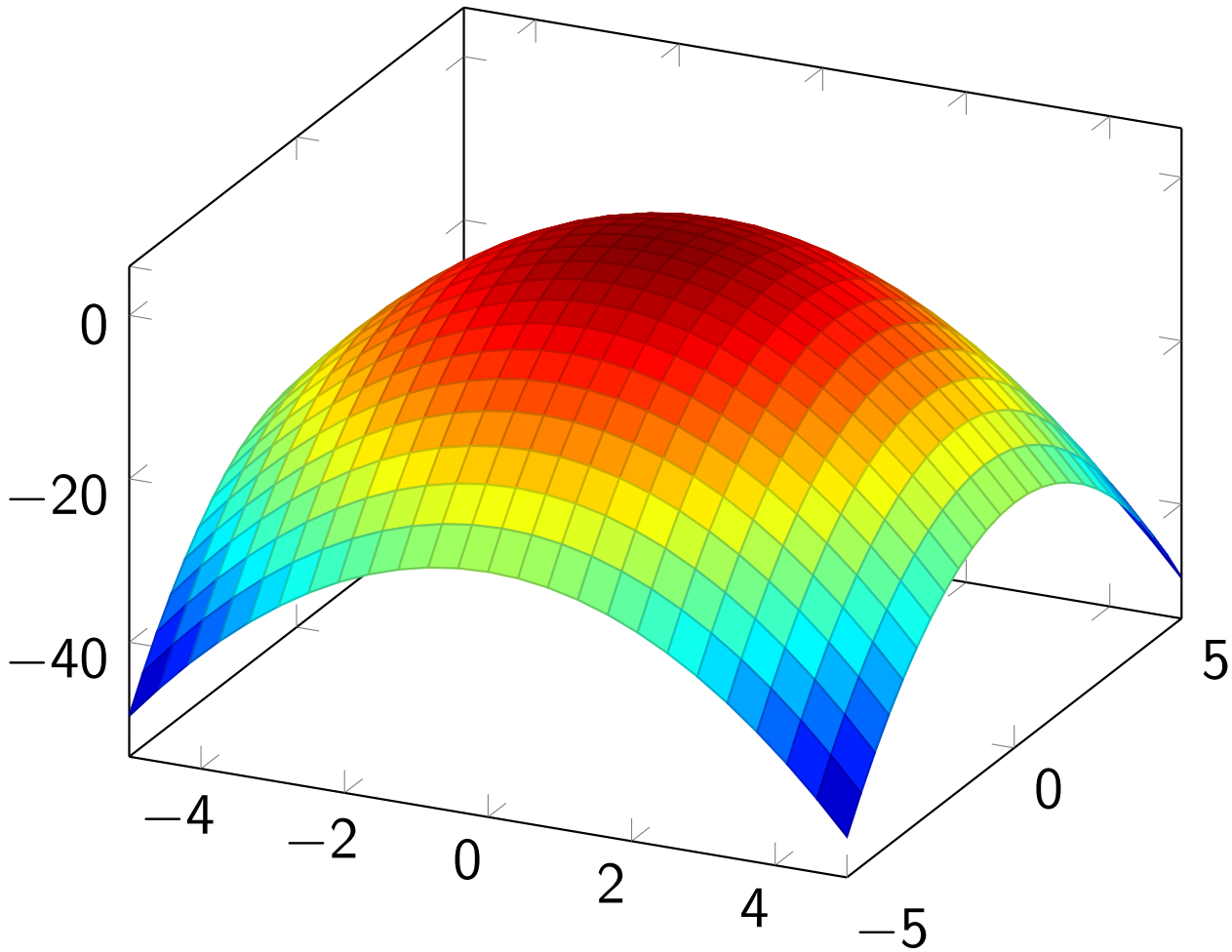
Editng 3D Graph

- Surf Allows for easier visibility of how the graph looks
- "Surf, colormap/jet" allows for better shading to highlight different elevations
- You can also use "mesh" to create a wireframe plot that emphasizes the lines of the graph

```
\usepackage{pgfplots}
```

```
 \begin{tikzpicture}
    \begin{axis}
    \addplot3[surf]{1-x^2-y^2};
    \end{axis}
\end{tikzpicture}
```

3D Graph: Surf



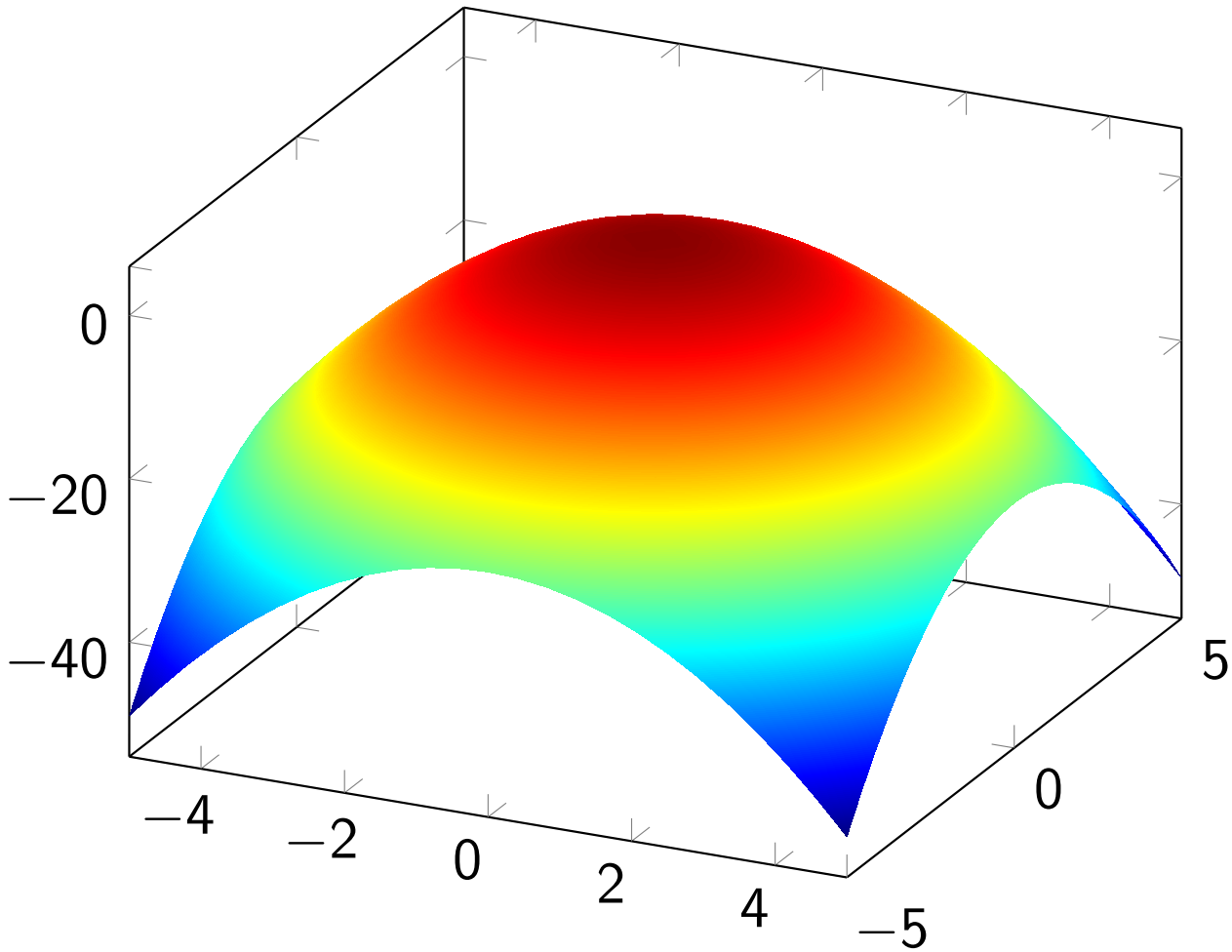
Editing Graph Lines

- You can remove the graph lines to make it easier to see the shading of the graph

```
\usepackage{pgfplots}


 \begin{tikzpicture}
    \begin{axis}
    \addplot3[shader=interp]{1-x^2-y^2};
    \end{axis}
\end{tikzpicture}
```

3D Graph: Shader

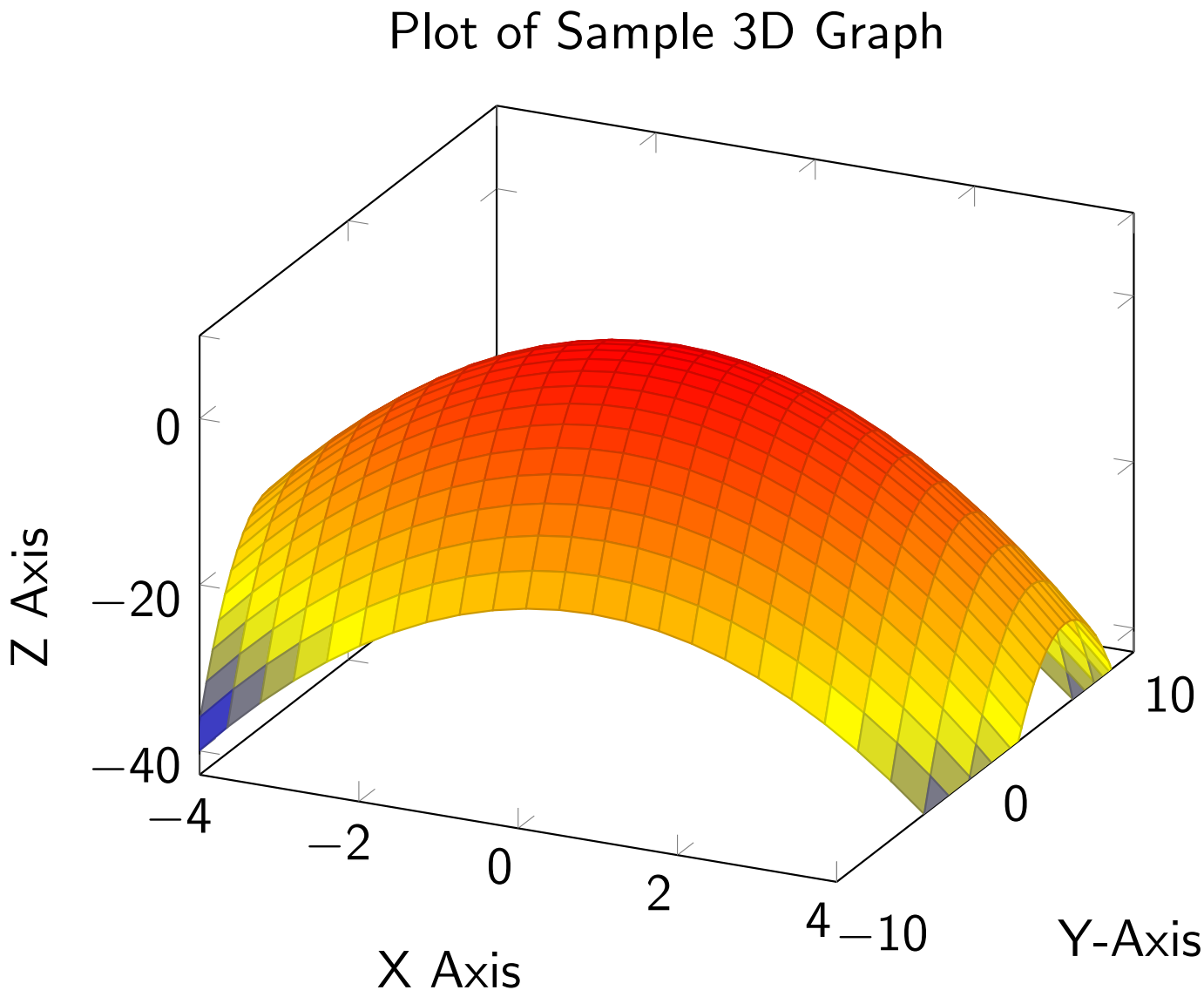


Editing the Axis

- Editing the axis is the same steps as the 2D graph

```
\begin{tikzpicture}
    \begin{tikzpicture}
    \begin{axis}[
      xmin=-4, xmax=4, ymin=-150, ymax=150,
      zlabel={Z Axis},
      ylabel={Y-Axis}, % Y-axis label
      xlabel={X Axis}, % X-axis label
      title={Plot of Sample 3D Graph}, % Plot title
    ]
    \addplot3[surf]{1-x^2-y^2};
    \end{axis}
\end{tikzpicture}
    \addplot3[shader=interp]{1-x^2-y^2};
    \end{axis}
\end{tikzpicture}
```

3D Graph: Final



Overview

- How to create a 2D graph
- How to edit a graph to make it easier to study (color, sample size, line type, and mark)
- How to edit the axis to create labels, titles, and new margins
- How to create a 3D graph
- How to edit a graph to make it easier to study (Surf and shader)
- How to edit the axis to create labels, titles, and new margins