```latex
\documentclass{beamer}
\usepackage{pgfplots}
\usepackage{verbatim}
\usepackage{enumitem}
\title{Creating Graphs Using LaTex}
\subtitle{2D/3D Graphs}
\author{By: Hamza Hosein, Anoop George, Adrian Pecak}
\date{\today}
\begin{document}
\frame{\titlepage}
% Showing what we will create
\begin{frame}{Steps in Creating 2D Graphs}
    \begin{tikzpicture}
    \begin{axis}
    \addplot {x^3};
    \end{axis}
\end{tikzpicture}
\end{frame}
% Simple Graph
\begin{frame}[fragile]{Simple Graph}
\begin{itemize}[label= \textcolor{blue} {\textbullet}]
\item Code for creating a simple 2D graph
\end{itemize}
\begin{verbatim}
\begin{tikzpicture}
    \begin{axis}
    \addplot {x^3};
    \end{axis}
\end{tikzpicture}
\end{verbatim}
\end{frame}
% How to edit color
\begin{frame}[fragile]{How to Edit the Color of the Line}
\begin{itemize}[label= \textcolor{blue} {\textbullet}]
\item Can be changed to any color of desire
\end{itemize}
\begin{verbatim}
\usepackage{pgfplots}
\begin{tikzpicture}
    \begin{axis}
    \addplot[color=red] {x^3};
    \end{axis}
\end{tikzpicture}
\end{verbatim}
```

\end{frame}
% How to edit line
\begin{frame}[fragile]{How to Edit the Type of Line}
\begin{itemize}[label= \textcolor{blue}{\textbullet}]
\item Other types of lines such as (thick, dotted, dash-dot, dash-dot-dot)
\end{itemize}
\begin{verbatim}
\usepackage{pgfplots}
\begin{tikzpicture}
   \begin{axis}
   \addplot[dashed] {x^3};
   \end{axis}
\end{tikzpicture}
\end{verbatim}
\end{frame}
% How to edit the type of mark
\begin{frame}[fragile]{How to Edit the Type of Mark}
\begin{itemize}[label= \textcolor{blue}{\textbullet}]
\item Other ways to change the mark such as o(blank circle), square, triangle, diamond, +(plus), -(minus),
x, star
\end{itemize}
\begin{verbatim}
\usepackage{pgfplots}
\begin{tikzpicture}
   \begin{axis}
   \addplot[mark=*] {x^3};
   \end{axis}
\end{tikzpicture}
\end{verbatim}
\end{frame}
% How to edit the number of dots
\begin{frame}[fragile]{How to Edit the Number of Dots}
\begin{itemize}[label= \textcolor{blue}{\textbullet}]
\item Any number of dots can be used to graph your line
\end{itemize}
\begin{verbatim}
\usepackage{pgfplots}
\begin{tikzpicture}
   \begin{axis}
   \addplot[ samples=10] {x^3};
   \end{axis}
\end{tikzpicture}
\end{verbatim}
\end{frame}

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% How to edit the titles and margins
\begin{frame}[fragile]{How to Edit the Titles and Margins}
\begin{itemize}[label= \textcolor{blue}{\textbullet}]
    \item You can edit the title and margins to be anything you want
\end{itemize}
\begin{verbatim}
\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}
\end{verbatim}
\end{frame}
% Combination of all edits
\begin{frame}[fragile]{Combination of All Edits}
\begin{tikzpicture}
  \begin{axis}[
    xmin=-4, xmax=4, ymin=-150, ymax=150,
    xlabel={Independent},
    ylabel={Dependent},
    title={Plot of Sample 2D Graph},
  ]
  \addplot[color=red, dashed, mark=*, samples=10] {x^3};
  \end{axis}
\end{tikzpicture}
\end{frame}
% Simple 3D Graph
\begin{frame}[fragile]{Simple 3D Graph}
 \begin{tikzpicture}
  \begin{axis}
  \addplot3{1-x^2-y^2};
  \end{axis}
\end{tikzpicture}
\end{frame}
%Simple 3D Graph Code
\begin{frame}[fragile]{Simple 3D Graph Code}
\begin{itemize}[label= \textcolor{blue}{\textbullet}]
\item Code for creating a simple 3D graph
```

```
\item 3D Graph: "addplot3"
\end{itemize}
\begin{verbatim}
\usepackage{pgfplots}
 \begin{tikzpicture}
   \begin{axis}
   \addplot3{1-x^2-y^2};
   \end{axis}
\end{tikzpicture}
\end{verbatim}
\end{frame}
%Simple 3D Graph Code
\begin{frame}[fragile]{Editng 3D Graph }
\begin{itemize}[label= \textcolor{blue} {\textbullet}]
\item Surf Allows for easier visibility of how the graph looks
\item "Surf, colormap/jet" allows for better shading to highlight different elevations
\item You can also use "mesh" to create a wireframe plot that emphasizes the lines of the graph
\end{itemize}
\begin{verbatim}
\usepackage{pgfplots}
 \begin{tikzpicture}
   \begin{axis}
   \addplot3[surf]{1-x^2-y^2};
   \end{axis}
\end{tikzpicture}
\end{verbatim}
\end{frame}
%Simple 3D Graph Code
\begin{frame}[fragile]{3D Graph: Surf }
 \begin{tikzpicture}
   \begin{axis}
   \addplot3[surf,colormap/jet]{1-x^2-y^2};
   \end{axis}
\end{tikzpicture}
\end{frame}
%Simple 3D Graph Code
\begin{frame}[fragile]{Editing Graph Lines}
\begin{itemize}[label= \textcolor{blue} {\textbullet}]
\item You can remove the graph lines to make it easier to see the shading of the graph
\end{itemize}
\begin{verbatim}
\usepackage{pgfplots}
 \begin{tikzpicture}
   \begin{axis}
```

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    \addplot3[shader=interp]{1-x^2-y^2};
    \end{axis}
\end{tikzpicture}
\end{verbatim}
\end{frame}
```
%Simple 3D Graph Code
```
\begin{frame}[fragile]{3D Graph: Shader }
 \begin{tikzpicture}
    \begin{axis}
\addplot3[surf,colormap/jet,shader=interp]{1-x^2-y^2};
    \end{axis}
\end{tikzpicture}
\end{frame}
```
%Simple 3D Graph Code
```
\begin{frame}[fragile]{Editing the Axis}
\begin{itemize}[label= \textcolor{blue} {\textbullet}]
\item Editing the axis is the same steps as the 2D graph
\end{itemize}
\begin{verbatim}
 \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}
\end{verbatim}
\end{frame}
```
%Simple 3D Graph Code
```
\begin{frame}[fragile]{3D Graph: Final }
 \begin{tikzpicture}
   \begin{axis}[
    xmin=-4, xmax=4, ymin=-10, ymax=10, zmin==10, zmax=10,
    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}
\end{frame}
%Overview
\begin{frame}[fragile]{Overview}
\begin{itemize}[label= \textcolor{blue}{\textbullet}]
\item How to create a 2D graph
\item How to edit a graph to make it easier to study (color, sample size, line type, and mark)
\item How to edit the axis to create labels, titles, and new margins
\item How to create a 3D graph
\item How to edit a graph to make it easier to study (Surf and shader)
\item How to edit the axis to create labels, titles, and new margins
\end{itemize}
\end{frame}
\end{document}
```