BINARY SOLUTIONS

MAT 275

Plotting Function:

$$\frac{e^{t/10}.\sin(t)}{t^2+1}$$

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Introduction

- This script aims to plot the function $\frac{e^{t/10}.\sin(t)}{t^2+1}$ over a specified range of time values (t) using the ‘plot’ function.

Problem Statement

The objective is to create a MATLAB script that generates and plots the values of a given mathematical function over a defined range of independent variable values.

Solution Steps

- **Generate Time Values:**
  - Use the ‘linspace’ command to generate a vector ‘t’ with 91 elements ranging from 1 to 10.
- **Define Dependent Variable:**
  - Define the dependent variable ‘y’ using the specified mathematical expression involving the exponential function, sine function, and a polynomial.

Solution Steps

- **Plot the Function:**
  - Use the plot function to create a line ‘plot’ of the dependent variable ‘y’ against the independent variable t.
  - Set the line color to black ('k').
- **Title, Labels, and Grid:**
  - Set a title for the figure, xlabel, and ylabel to provide context to the plot.
  - Enable the grid for better visualization.

Pseudo Code

1. Clear the command window and clear all variables from memory.
2. Generate a vector t with 91 equally spaced elements ranging from 1 to 10 using the linspace command.
3. Calculate y as (exp(t/10) * sin(t)) / (t^2 + 1) using element-wise operations.
4. Plot y against t using a black line.
5. Set the title of the plot to 'exp(t/10) * sin(t) / (t^2 + 1)'.
6. Set the label of the x-axis to 'time axis'.
7. Set the label of the y-axis to 'y values'.
8. Turn on the grid for the plot.

MATLAB Code

```
clc

clear all

t=linspace(1,10,91); % linespace command to generate 91 elements

y=(exp(t/10).*sin(t))./(t.^2+1);    % defining y using dot operators

plot(t,y,'k')  % plotting y using black color

title(' exp(t/10).*sin(t))./(t.^2+1)'); % tiltle for figure

xlabel(' time axis ')   % xlabel

ylabel(' y values')     % y label

grid on
```

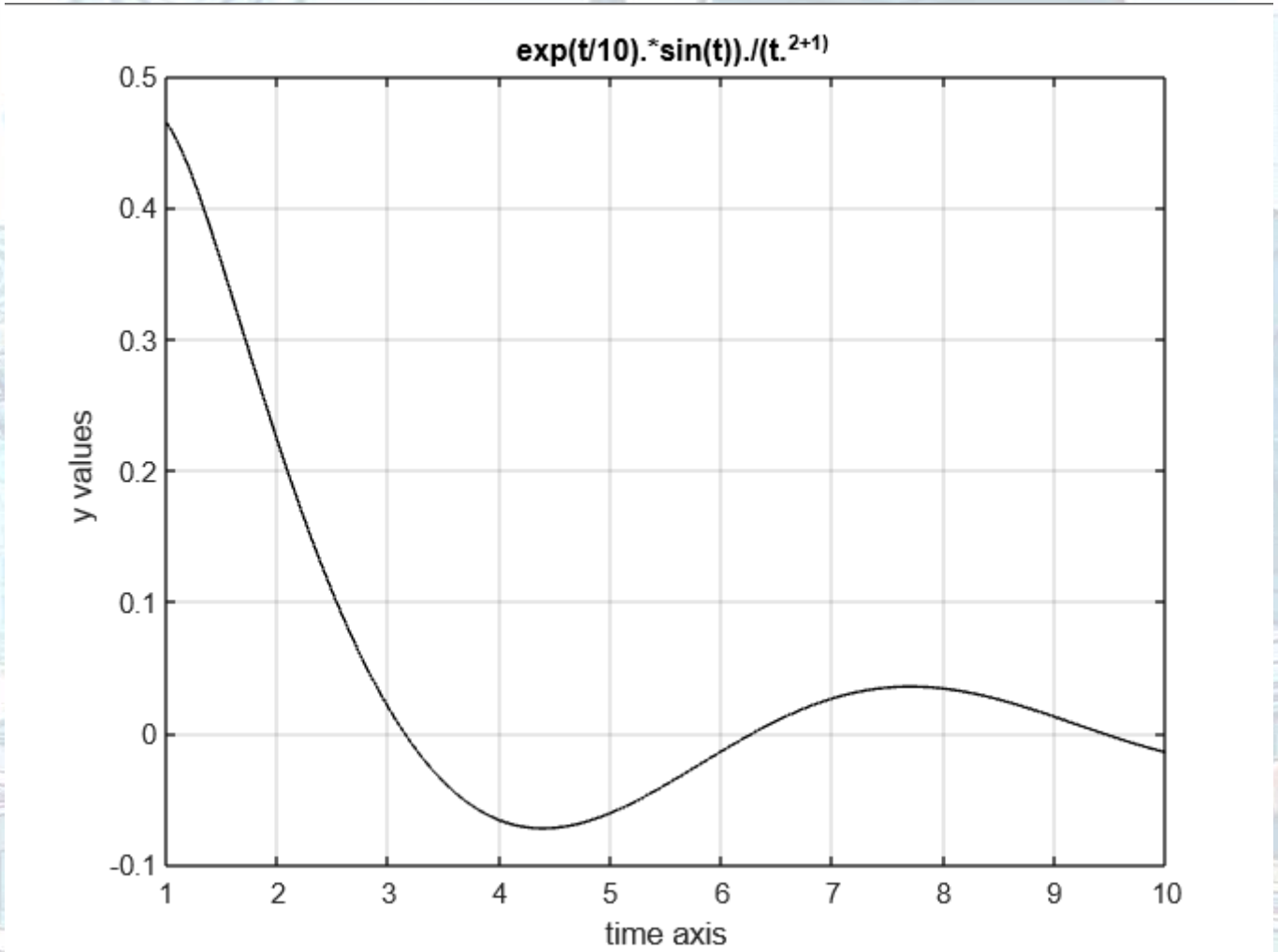
Code Explanation

- **clc; clear all**
  - Clears the command window.
  - Clears all variables from the MATLAB workspace.
- **t = linspace(1, 10, 91);**
  - Creates a row vector t with 91 linearly spaced elements between 1 and 10 using the linspace function.
- **y = (exp(t/10) .* sin(t)) ./ (t.^2 + 1);**
  - Defines a vector y based on the formula (exp(t/10) .* sin(t)) ./ (t.^2 + 1).

Code Explanation

- **plot(t, y, 'k')**
  - Plots the vector y against t using a black color ('k').
- **title(' exp(t/10).*sin(t))./(t.^2+1)');**
  - Sets the title of the figure.
- **xlabel(' time axis ')**
  - Sets the label for the x-axis.
- **ylabel(' y values')**
  - Sets the label for the y-axis.
- **grid on**
  - Displays the grid on the plot.

Graph



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Conclusion

The script serves as a valuable tool for visualizing the behavior of a mathematical function, providing a clear and concise representation through a line plot.

Additional Comments/Tips

- The script is designed for clarity and simplicity, making it easy for users to understand and modify as needed.
- Users can experiment with different time ranges or modify the expression to explore variations in the plotted function.