Math 107 Lecture 5

Logical Indexing and Plotting in MATLAB

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» Announcements and Objectives

Announcements

- Skill Check 2 in two weeks (9/25, 60 mins then lecture)
- Pre-Notes due before start of next lecture
- Assignments Due Friday (9/13):
  - HW2 Handwritten Questions
  - HW2 Coding Problems
  - HW2 MATLAB File Upload
- Office Hours Update: All of my office hours are now offered in hybrid format.

Objectives

- Plot functions in MATLAB with custom line and marker styles
- Add titles and labels, and adjust axes on plots

Plotting in MATLAB

» Plotting a Single Function

1. Create a vector x with your desired starting value, ending value, and step size.
2. Create the vector y using x in a computation.

`plot(x,y)`	Creates a line plot of y versus x
`plot(x,y,'Options')`	Creates line plot with custom options

Examples of custom options

* color, e.g., `'r'`, `'b'`, `'g'`, `'k'`, `'m'`, `'c'`
* line type, e.g., `'-'`, `'--'`, `':'`, `'-.'`
* marker type, e.g., `'o'`, `'s'`, `'d'`,`'*'`
* `'linewidth'`, number

Remark: See the MATLAB documentation for `plot` for more details.

» Plotting Line Segments

When plotting *a* line segment between the points `(x1,y1)` *and* `(x2,y2)`, the syntax is to plot the vector of x values *against* the vector of y values.

```
plot([x1, x2], [y1, y2])
```

» Title, Labels, Limits, and Legend

```
title('Title of Plot')


xlabel('Horizontal axis label')
ylabel('Vertical axis label')


xlim([xmin xmax])
ylim([ymin ymax])


legend('1st plot', '2nd plot', 'Location', 'Best')
```

» Plotting Multiple Functions on Same Figure

Method 1

```
plot(x1, y1, 'options1', x2, y2, 'options2')
```

Method 2

```
plot(x1, y1, 'options1')
hold on
plot(x2, y2, 'options2')
```

» Plotting Activity

Work together to complete the following plotting exercises:

1. Plot $y = x^2 - e^{3x}$ over the interval $[-5, 5]$.
2. Plot $z = \sin(t)/t$ over the interval $[1, 10]$.
3. Plot $g = x^3 e^x \sin(x)$ over the interval $[0, 10]$.
4. Plot two line segments on the same figure: One between the points $(3, -4)$ and $(-5, 2)$ and another between the points $(-5, -3)$ and $(3, 0)$.