

Lines and Plots

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Overview

There are two objectives in this lab:

- Review our ability the work with the equations of lines.
- Use Maple 9.5 to produce report-quality figures.

Maple Essentials

- The *Lines* tutor is started from the Maple 9.5 user interface under the **Tools** menu:

Tools → **Tutors** → **Precalculus** → **Lines ...**

- New Maple commands introduced in this lab include:

Command	Description
<code>plot</code>	plot one or more functions on a specified window <code>plot(f, x=a..b);</code> plots the graph of $y = f(x)$ for $a < x < b$; <code>plot([f, g], x=a..b);</code> graphs two functions in a single plot
<code>:=</code>	assign a name to a quantity

Preparation

- Review parallel and perpendicular lines.
- Read Section 1.2: *Graphing Functions Using Calculators and Computer Algebra Systems* in Anton. Specifically, review choosing a viewing window and compression.

Assignment

This week's Mastery Quiz asks you to use Maple to generate a report-quality figure. The Activities in this lab will help prepare you to answer the Mastery Quiz questions. The deadline for turning in Mastery Quiz 2 will be announced in lab.

Activities

1. Launch the *Lines* tutor. Notice the four options for inputting data about your line. Use the appropriate line definitions to quickly solve the following problems.
Note: You may want to use the tutor more than once.
 - (a) Find the *slope-intercept* form of the equation of the line passing through the points (2,4) and (1,-7).
 - (b) Find the *slope-intercept* form of the equation of the line that is parallel to $y = 4x - 2$ and passes through the point (2,5).
 - (c) Find the *slope-intercept* form of the equation of the line that is perpendicular to $x - 4y = 7$ and passes through the point (3,-4).

2. Create one plot that displays the graph of all of the following equations:

- $f(x) = \sqrt{x}$
- $g(x) = |x|$
- $h(x) = 2x$

Use the viewing window $[-3,3] \times [-3,3]$ for your plot. Display $f(x)$ in blue, $g(x)$ in red, and $h(x)$ in green. Give your plot a title and legend. Finally, transfer your beautiful plot to a **Microsoft Word** document.

3. Repeat Activity 2 using $f(x) = 2 \sin(4x)$, $g(x) = \sin(x)$, and $h(x) = 2 + \cos(\frac{x}{2})$ on the viewing window $[-\pi, \pi] \times [-5, 5]$.

Example: Activity 2

- First, assign the functions to the letters f, g, and h, respectively. This will make the functions easier to call and change in the future.
> f:= sqrt(x);
> g:= abs(x);
> h:= 2*x;
- Next, create a basic plot of the functions on the appropriate window.
> plot([f,g,h], x=-3..3, y=-3..3);
- Now adjust the plot command to color the functions as instructed. By choosing our own colors for the functions, we can more easily and accurately create the legend later.
> plot([f,g,h], x=-3..3, y=-3..3, color=[blue, red, green]);
- Again adjust the plot command to add a title. Every good figure has a title so it can easily be referenced within a report.
> plot([f,g,h], x=-3..3, y=-3..3, color=[blue, red, green], title="My Graph");
- To create the Legend, follow these steps:
 1. Position the cursor over the plot and press the right mouse button to see the context menu.
 2. Under the option **Legend**, select **Edit Legend**.
 3. Enter an appropriate label for each of the three functions.
- Finally, transfer your figure to a Word document as follows:
 1. Position the cursor over the plot and press the right mouse button to see the context menu. Select **Copy**.
 2. Open **Microsoft Word** from the **Start** menu at the bottom left of the screen. On the blank document, press the right mouse button to see the context menu. Select **Paste**.

Additional Notes

- The **Expression** palette can be used instead of typing the full Maple commands for many functions and operations. The **Symbol** palette contains other symbols, including π (Pi) and ∞ (infinity). To view both palettes simultaneously, drag one of the palettes to another edge of the Maple window.