

CS 121 Engineering Computation Lab

Lab 3

Bruce Char
Department of Computer Science
Drexel University
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Recap of Lab 2 Cycle

- Lab 2
 - Common errors
 - Using keyboard “e” instead of natural log base e
 - Not explicitly entering arithmetic multiplication operator between terms
 - Please follow lab directions – read over before starting development
 - Scripting considerations
 - Read over the problem first – then determine the changing parameters before beginning to develop the script itself
 - Be sure to document start/end of script and parameter section
 - Place parameters at top – before equations (the equations use the parameter values, which must be defined first)

Recap of Lab 2 Cycle

- Quiz 2
 - No one should still be having MapleTA access issues
 - Who utilized CLC?
 - Who attended chat sessions – about 15-20 over 2 day period?
 - Who found the Powerpoint slides for problems 4 and 5 useful?
- Pre-lab (3) Quizlet
 - Many questions pertain to Lab 3 concepts – will aid in understanding lab
 - Please be sure to read both Chapters and Lab description prior to taking quizlet!

Administrative Notes

- Special accommodations – if you have University permission for special accommodations (eg. extended exam time), please give copy of notice to instructor
- Please be sure to check your lab, quiz, and quizlet grades when posted to bbVista and immediately report any discrepancies to your instructor for resolution
 - There will be a cutoff date established for resolving such issues prior to final grade preparation
- Quiz 2 – maximum number of users encountered. Please try to complete the quizzes prior to the deadline. We'll see if there is any way to increase the load. However, extending the quiz is NOT a future option!

Lab 3 Overview

- Based on materials from Chapters 5 and 6
 - Chapter 5
 - Textual vs. “clickable” interface for statement entry – solve and plot operations
 - Introduction to lists
 - Some plot options
 - Maple’s on-line documentation feature
 - Chapter 6
 - Functions
 - Maple vs. user-defined functions

Lab 3 Overview

- Part 1
 - Open and execute an existing script on multiple sets of parameters
 - Revise script to solve a slightly different problem
- Part 2
 - Point plotting – (x,y) coordinates
 - Least squares data fitting (curve fitting) feature
 - Combining 2 plots onto same grid

Discussion of Lab 3 Concepts

- Textual statement entry in Maple
 - So far, we've used Maple's "clickable" interface (palettes and right clicks) to create functions, plots and solve equations
 - Demo: $x^2 - 7x - 98$ -> right click Plots -> 2D plot
 - Note -10 to 10 default domain
 - Note: only one solution at $x=-7$ crosses the x-axis
 - To see both solutions ($x=-7$ and $x=14$), we must manually intervene using the Plot Builder
 - Right click Plots -> Plot Builder -> $x=-20$ to 20
 - Both solutions cross the x-axis now

Discussion of Lab 3 Concepts

- Plot using textual representation
 - Demo:
 - `plot(x^2 - 7*x - 98)`
 - `plot(x^2 - 7*x - 98, x=-20..20)`
 - Note the difference:
 - “Clickable” interface – had to manually fill in domain within Plot Builder
 - Textual – merely edit the plot statement – no dialog box
 - If using within a script, could just make domain endpoint parameters
 - `dstart := -20`
 - `dend := 20`
 - `plot(x^2 - 7*x - 98, dstart..dend)`

Discussion of Lab 3 Concepts

- Textual version of “solve”
- Demo:
 - `eqn := temperature = 133.5 + 0.4858*t`
 - `temperature := 0`
 - `solve(eqn, t) -> 274.8...`
 - Note: we are solving the equation “eqn” for t

Discussion of Lab 3 Concepts

- Plotting
 - Some plot options
 - Demo: `plot(X^2 + 3, color="blue", labels=["X", "Y"])`
 - Demo: 2 plots on the same grid, one being a horizontal (target) line
 - `target := 20`
 - `plot([x^2 + 3, target])`

Discussion of Lab 3 Concepts

- Plotting (continued)
 - Lists and point plots
 - A list is a sequence of values separated by commas and enclosed in []
 - `X := [0, 1, 2, 3, 4, 5]`
 - `Y := [3.1, 4.0, 4.9, 6.1, 7.2, 7.9]`
 - We can plot these 2 lists of points representing (0, 3.1), (1, 4.0), (2, 4.9), (3, 6.1), (4, 7.2), (5, 7.9)
 - `plot(X, Y, style=point) -> point plot`

Discussion of Lab 3 Concepts

- Plotting – super-imposing 2 plots on same grid
 - eqn := $y1 = x1 + 3$
 - `plot(rhs(eq), x1=0..6, color="blue")`
 - click on plot result and copy/paste at bottom of worksheet
 - `plot(X, Y, style=point)`
 - click on plot result and copy
 - click on plot at bottom of worksheet and paste

Discussion of Lab 3 Concepts

- Some miscellaneous concepts for Part 1
 - unassign('name') – sets the parameter 'name' to NULL
 - $a := 1$
 - $a \rightarrow 1$
 - unassign('a')
 - $a \rightarrow a$
 - User defined functions – brief introduction for now
 - Used in Part 1 script to define voltage as a function of time
 - For now, just note syntax to define plus how to call
 - $T[i] := 63$
 - $T[a] := 266$
 - $k := 0.09$
 - $V := t \rightarrow (T[i] + (T[a] - T[i]) * (1 - \exp(-k * t)))$
 - $V(0) \rightarrow 63$

Discussion of Lab 3 Concepts

- Some concepts used in Part 2
 - Maple Online Help
 - Help
 - search “least squares”
 - Note examples in red – Demo:
 - » with(Curvefitting):
 - » LeastSquares([[0,1],[1,2],[2,3],[3,10]],V) ->
 - » $-1/5 + 14/5 V$
 - File -> Close Help
 - The least squares method
 - Will create a linear equation that “best matches” the list of (x,y) data points
 - Method minimizes the sum of the squares of distances between the actual points and the linear approximation

Quiz 3 Activities

- Quiz 3 will be released on Friday (10/30) at 6pm
 - Deadline: Wednesday (11/4) at 4:30pm
 - Makeup quiz: Thursday (11/5) at 9am through Sunday (11/8) at 11:30pm
 - 30% penalty
- Pre-lab quizlet for Lab 4
 - Released on Thursday (11/5) at noon through Monday (11/9) at 8:30am
- Be sure to visit the CLC for quiz assistance (11/2-11/6)
- Be on alert for Chat sessions (11/2 and 11/3) along with Quiz problem slides