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 names, 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 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 grading
  – If you accidentally re-open a quiz after you have graded the original one:
    • You need to grade and exit the newly opened quiz before you can open the next test (eg. Quizlet)
    • Your original score will be retained (MapleTA will always report your highest quiz result)!
Lab 3 Overview

- Based on materials from Chapters 6 and 7
  - Chapter 6
    - Textual vs. “clickable” interface for statement entry – solve and plot operations
    - Introduction to lists
    - Some plot options
    - Maple’s on-line documentation feature
  - Chapter 7
    - Using and Defining 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 \((0, 3.1), (1, 4.0), (2, 4.9), (3, 6.1), (4, 7.2), (5, 7.9)\)
      – \( \text{plot}(X, Y, \text{style}=\text{point}) \rightarrow \text{point plot} \)
Discussion of Lab 3 Concepts

• Plotting – super-imposing 2 plots on same grid
  – eqn := y1 = x1 + 3
  – plot(rhs(eqn), 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 → 1
    • unassign(‘a’)
    • a → 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→(T[i]+ (T[a]-T[i])*(1-exp(-k*t))}
    • V(0) → 63
Discussion of Lab 3 Concepts

• Some miscellaneous concepts for Part 1
  – Command completion – using the “esc” key
    • Use to provide proper syntax for an operation
    • Demo: solve + “esc” → list of commands starting with “solve”
      → solve(eqn) → solve(x^2-4=0)

  – The “eval” operation
    • Use to evaluate an expression at a certain value
    • Demo: exp1:=3 + 5*t
      • eval(exp1,t=5) → 28
      • Use eval + “esc” to show other variations
Discussion of Lab 3 Concepts

• Some Maple features 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
Getting Starting
Lab 3 Tips

• Part 1 – different problem (finding “k”)
  – Huddle with your teammates to determine strategy before attempting to solve

• Part 1 – exchanging scripts with teammates for version 2
  – work together so that entire team reaches this stage at same time
  – Switch seats to execute your teammate's version of the solution
  – Provide teammate with critique of his/her solution as appropriate
Quiz 3 Activities

• Quiz 3 will be released on Friday (10/29) at 6pm
  – Deadline: Wednesday (11/3) at 4:30pm
  – Makeup quiz: Thursday (11/4) at 9am through Sunday (11/7) at 11:00pm
    • 30% penalty

• Pre-lab quizlet for Lab 4
  – Released on Thursday (11/4) at noon through Monday (11/8) at 8:00am

• Be sure to visit the CLC for quiz assistance (11/1-11/5)

• Be on alert for Quiz hint slides