CS122 Engineering Computation Lab
Lab 4

Bruce Char
Department of Computer Science
Drexel University
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Review of Lab 3 Cycle

• Lab 3 – completed – including make up labs for missed classes
  – Quiz grades to be issued this week. No make up quiz for this cycle.

• Major Lab 3 concepts to remember
  – Use of “for”, “while” loops and “if” statements to solve a variety of Blammo firing angle analyses
  – Introduction to particle movement in box automation – drawBoxB function
Review of Lab 3 Cycle

• **drawBoxB function syntax:**
  – \( \text{drawBoxB} := (\text{width, height, xlo, ylo, c}) \rightarrow \)
    • display([line([xlo,ylo],[xlo+width,ylo],color=c),
    • line([xlo+width,ylo],[xlo+width,ylo+height],color=c),
    • line([xlo,ylo],[xlo,ylo+height],color=c),
    • line([xlo,ylo+height],[xlo+width,ylo+height],color=c)],
    • axes=none, scaling=constrained);

• **Need in Lab 4 to continue movement of particle in box exercises**
Review of Lab 3 Cycle

- Blammo trajectory analyses – why we used “for”, “while” and “if”
  - 1.1 – Compute distance traveled for a variety of firing angles
    • for angle from 30 to 75 do
      - Simple “for” loop to cover integer range of angles
  - 1.2 – Find smallest angle that hits target
    • for angle from 10 to 90 while (abs(distance-targetdist) > tol) do
      - “for” loop defines overall set of angle to consider
      - “while” loop will stop the computations the 1st time an angle produces a distance that hits target
  - 1.3 – Print all firing angles that produce a target hit
    • for angle from 10 to 89 do
      if (abs(distance-target) < tol) then
      printf (…….);
    end if;
    a. Must compute for all angles, since multiple angles can produce the desired result
    b. Will only print out statistics for the angles that produce a hit on target
Administrative Notes

- Please contact your instructor immediately if you are eligible for extended time for the Proficiency Exam.
- Please also review your bbVista Lab and Quiz grades and report any discrepancies to your instructor.
- As with cs121, there will be an opportunity to earn a 2% bonus for submitting a student evaluation. Details to follow!
Proficiency Exam Preview

• Same logistics as in cs121
  – Proctored format
  – Two 6 point quizzes (about 25 and 65 minutes)
  – Sign-in and score verification
  – No access to bbVista – will have access to all course site materials
• To be conducted during week of March 8 (week 10) in class for your regularly scheduled lab session
• Practice – week of March 1 (week 9)
  – All 4 quizzes taken throughout the term will be re-posted – note that quiz 4 will take place during week 9
  – A special quiz containing some problems not included in regular quizzes will also be issued – these questions are candidates for inclusion
  – Lab solutions will be posted on bbVista
  – Full quiz week (9) CLC coverage – Monday through Friday
Lab 4 Overview

• Based on materials from Chapter 12, 13 and 14 readings
  – Chapter 12 – More on repetition and looping
    • “while” loop – conditional looping + relational operators
    • Combining “for” and “while” loops
    • Dealing with runaway (infinite) “while” loops
  – Chapter 13 – Conditional execution
    • Choosing alternatives – if .. then .. else .. elif constructs
  – Chapter 14 – additional repetition concepts
Lab 4 Overview

• Lab 4 outline
  – Part 1 – particle movement in box
    • 1.1 - revising script from Lab 3 (drawBoxB + East wall bounce) to handle bounce off of West wall
    • 1.2 – adding logic to bounce off of North and South walls
    • 1.3 – simulating diagonal movement and movement within a box of smaller dimensions
Lab 4 Overview

• Lab 4 outline
  – Part 2 – Movement of a bouncing ball
    • 2.1 – modification of a starter script (Blammo trajectory logic) to create an initial trajectory into ground
    • 2.2 – Further modification to produce bounces and rebounds off of ground
    • 2.3 – Plot and movie to show a specified number of bounces
Lab 4 Maple Concepts: Discussion and Demo

• Choosing among alternative actions – “if” statement
  – if (condition) then
    • Code to execute if condition is true
  – end if;

  – if (condition) then
    • Code to execute if condition is true
  – else
    • Code to execute if condition is false
  – end if;

  – Many examples in chapter readings, demo and lab
Lab 4 Maple Concepts:
Discussion and Demo

• Choosing among cases – if-then-elif-else-end
  – if (condition1) then
    • Code to execute if condition1 is true
  – elif (condition2) then
    • Execute if condition2 is true
    • Note – only can reach here if condition 1 was false
  – elif (condition3) then
    • if condition 3 true (1 and 2 were false)
  – else
    • “catch all” bucket – if all case conditions specified above were false
  – end if;

• East, West, North and South wall bounces for particle movement will utilize this construct

• See today’s demo for example and syntax
Lab 4 Maple Concepts: Discussion and Demo

• Use of the ptpos (list) variable in Part 1 of today’s lab
  – ptpos[x,y] is a list that represents a point in the X-Y grid with an x coordinate = x and y coordinate = y
  – ptpos[9,1] indicates a point within the box whose location in a 10x10 box will be at x=9 and y=1
  – To access the x component of the point \( \rightarrow \) ptpos[1]
  – Likewise, the y component is accessed \( \rightarrow \) ptpos[2]
Lab 4 Maple Concepts: Discussion and Demo

• Demo of Maple features needed for this lab

  – Open the Maple worksheet demo file form the course web site
    • CS122Lab4Demo.mw
  – The following concepts are illustrated
    • Looping over a list of values
    • Using the “if – elif – else – end if” construct for case decisions
Quiz Week (9) Activities

• Quiz 4 will be released on Friday (2/26) at 6 PM
  – Deadline: Wednesday (3/03) at 4:30 PM
  – Makeup quiz – from Thursday (3/04) at 9 AM through Sunday (3/7) at 11:30 PM
    • 30% penalty
• No Pre-lab quizlet
• Be sure to visit the CLC for quiz assistance
• Practice week for Proficiency Exam
  – Will announce posting of practice quizzes shortly
  – Exam to be conducted during week of March 8 (week 10)