CIS 1.5 Fall 2008 Lab 3, Part 1

Instructions

- This is the first part of the third homework/lab assignment for CIS 1.5.
- The entire assignment will be worth 10 points.
- The first part is worth 5 points and will be distributed and worked on in class on Tuesday October 14th
- The second part is worth 5 points and will be distributed and worked on in class on Monday October 20th.
- **Both parts together are due on Wednesday October 29th** and must be submitted by email (as below).
- **Follow these emailing instructions:**
  1. Create a mail message addressed to *parsons@sci.brooklyn.cuny.edu* with the subject line **CIS 1.5 HW3**.
  2. Attach ONLY the **.cpp** files for each part, as outlined below.
     DO NOT ATTACH THE **.cbp** (CodeBlocks Project) files!
  3. Failure to follow these instructions will result in points being taken away from your grade. The number of points will be in proportion to the extent to which you did not follow instructions... (which can make it a lot harder for me to grade your work — grrrr!)

1 Before you start

- Get the "fox and rabbit" example in `fox.cpp` from Professor Parsons (or if you are at home, download it from the class web page. It is one of the examples for Unit III).
- Make sure you can run the program.
  (0 points)

2 Calculating distance

- Modify the program to include a function `distance` that takes as parameters the x and y values of both rabbit and fox, and returns the straight line distance between the fox and the rabbit.
  The formulat for calculating the straight line distance between the points $(x1, y1)$ and $(x2, y2)$ is:
  $$distance = \sqrt{(x1 - x2)^2 + (y1 - y2)^2}$$
- Use this function to print out the straight-line distance between the fox and the rabbit every time that they move.
  (2 points)

3 Calculating distance again

- Modify the program to include a second function `mDistance` that that takes as parameters the x and y values of both rabbit and fox returns the "Manhattan distance" between the fox and the rabbit
  The formula for calculating the straight line distance between the points $(x1, y1)$ and $(x2, y2)$ is:
  $$distance = \sqrt{(x1 - x2)^2} + \sqrt{(y1 - y2)^2}$$
- Use this function to print out the Manhattan distance between the fox and the rabbit every time that they move.
  (1 points)

4 Are the fox and the rabbit aligned?

- Modify the program to include a third function `aligned` that takes as parameters two integer values and returns `true` if they are the same.
- Use this function to print out the message "Aligned" if the fox and the rabbit either have the same x value or the same y value.

  (2 points)

5 Extra credit question

- At the moment, the fox moves randomly. We'd like the fox in a more sensible way, so that it moves *towards* the location of the rabbit.
- Write a function that calculates a new x-coordinate for the fox, given the current positions of the fox and rabbit, and under the constraint that the fox can only move one square in the x direction at a time.
- Now write a similar function that calculates a new y-coordinate for the fox.
- Use these two functions to move the fox.

  (1 point)

6 Now hand it in

- Save the (working) program that includes all the functions you have written as **hw3-1.cpp** and send it to me along with the answers to Lab III Part 2.

Lab III, part 2

... will be distributed in class on Monday October 20th. You will also have time to finish this part on that day.