CPSC 478/578
HW #8
Due December 3, 2015, 11:55pm

Note that the requirements for each question may vary depending on whether you are registered for 478 or for 578. The area of this assignment is animation.

Turn-in Procedure

You should submit your work as a zip file using the classesv2 server. Please name your file as LastNameFirstName-Assignment8.zip
When your file is unzipped there should be subdirectories for each question named q1, q2, etc. In each directory you should have:
1. The HTML and Javascript programs you have written, or pdf's of your written response (either typed directly or scanned in).
2. If the question asks you to write code to make images, provide sample images created by your program. You can save these by clicking and saving results in your browser, or by taking a screenshot.
3. A readme.{txt, doc} that lists the input used to create the images you include, as well as answering any questions posed in the problem. You should also list the operating system (e.g. Linux, Windows 7, 8.1, 10, Mac OS 10.4.4) and browser (e.g. Firefox 40.0.2, Safari, IExplorer, Edge) that you used. If you programs fail on the machines used for grading, you may be asked to bring in your system to demonstrate that the files you submitted functioned in the environment you worked in.

1. (15 pts) **(478 and 578)** Express the point (0,2,0) as a quaternion. Following the steps shown in class for computing the result of a rotation using quaternions, find the result of rotating this point 30 degrees around the line that passes through the origin and the point (1,1,1).

2. (25 pts) **(478 and 578)** Consider a 2D velocity field defined by
(vx,vy) = ((y-5)+(5-x)/2), ((5-y)/2 +(5-x)) where the velocity is in m/s.
Starting an object at the point (x,y) = 4,6 , plot (using whatever code you want, please include your source) the path of the object moving for 5 seconds using:

a) a time step of 1 second using Euler's method

b) a time step of 0.1 second using Euler's method

c) a time step of 1 second using the Mid-Point method

d) a time step of 0.1 second using the Mid-point method

3. **(478 and 578)** (45 pts for 478, 30 pts for 578) The files starter_code.html and collide.js allow you to enter sizes and velocities for two balls, which then bounce back and forth on the html canvas. Update the code so that rather than just passing by each other, they collide elastically and have revised velocities. Assume the mass of each ball is equal to its area.

(578) (15 pts) Write a second version of the code that computes inelastic collisions. Add a button to allow the user to specify the percentage of energy lost at each collision. Each

ball should lose this percentage of its energy when it bounces against the edge of the canvas, and the total energy should be reduced by this percentage when the balls collide with each other.

4. (15 pts) **(478 and 578)** Provide an update on your final project plan. Elaborate more on the challenging aspects you are including in your game.