# Lab 2 – Bouncing Balls

Topic: Graphics and Animation
Deadline and Submission: Check Sakai

**A demo of this assignment can be seen here: https://youtu.be/nM3OkdW3O5M**

| # | Task | Check |
|---|---|---|
| **1** | Create a CustomView that draws a rectangular box and up to 100 circular balls. | 10 |
| **2** | Animate the balls by moving their (x, y) positions by (dx, dy) amount. Pick an initial position (x, y) which is somewhere in the middle of the box and pick a speed (dx, dy) such that the balls move smoothly. | 10 |
| **3** | Every time a ball hits one of the edges of the box or another ball, it should change its direction of movement. | 10 |
| **4** | Initially, there will be no bouncing balls. The main application's GUI should have an "Add Ball" button, which adds a new ball to the view. | 10 |
| **5** | Underneath the rectangular box, show the number of ball-to-ball collisions and the elapsed time. Reset these counters every time a new ball is added. | 10 |
| **6** | **(optional)** Mathematically compute the expected number of ball-to-ball collisions over a fixed period (e.g., 60 seconds) for a given number of balls (e.g., *k* ball). See if your mathematical estimation and the empirically observed collision counts match. For example, plot both the mathematical and the empirical (average) collision counts per minute for varying number of balls, k = 2, 3, 4, …, 50. | Extra Credit 5 |