CSE 107
Lab Assignment 2

In this assignment you will simulate random the process described in the following exercise from the recommended text *Probability and Random Processes* by Grimmett and Stirzaker.

> An urn contains a azure balls and c carmine balls, where $a > 0$ and $c > 0$. Balls are selected from the urn at random and discarded, until the first time a selected ball has a color different from its predecessor. That ball is then replaced, and the procedure is restarted. The process continues until the last ball is discarded. Show that this last ball is equally likely to be azure or carmine.

In particular, it is asserted that $P(\text{last ball is azure}) = P(\text{last ball is carmine}) = 1/2$, and that this probability is independent of the initial values of a and c. The exercise quoted above asks the reader to prove this fact. Here you will merely demonstrate the claim experimentally.

Notice that, unlike most other random processes we've studied, the probability of selecting a particular color changes after each ball is discarded. It's as if we're flipping a weighted coin that changes its probabilities after each flip.

Let the total number of balls be 100, so that $a + c = 100$, and let $a = 10, 50$ and 90, respectively. Run 2000 trials of the experiment for each value of a, and calculate the relative frequency of the last ball discarded being azure, in each case.

Create a pdf file called `Report.pdf` containing your results. (Do not submit your source code on this assignment.) Submit your report file to Gradescope before the due date.