NUMERICAL PROJECT 1
MTH 5500 STOCHASTIC CALCULUS

- This project counts as **extra credit** (3 points on the final grade).
- The project has to be handed in by **May 7** to get the credits.
- It can be done in teams or **three people or less**.
- The codes have to be **Python**.

(1) Write a program in Python that does the following:
   (a) Sample 100 independent standard Gaussians using the Box-Muller method.
   (b) Draw the graph of 10 paths of Brownian motion at 100 integer times.
   (c) Draw the graph of 10 paths of Brownian motion on $[0, 1]$ with points at every one-hundredth.
   (d) Draw the graph of 10 paths of Brownian bridge at 100 times.

   I want to see the code and the graph of the paths!

(2) Consider the stopping time

$$\tau = \min\{t \geq 0 : |B_t| \geq 1\} \ .$$

   This is the first time that B_t reaches 1 or -1. Draw a histogram for the distribution of τ on $[0, 3]$ using 1000 Brownian paths on $[0, 3]$.

Date: Louis-Pierre Arguin, February 21 2018.