Exercise 9. (PROGRAMMING)
Write a MATLAB / Python program to simulate the following experiments.

(a) Draw a dice 100 times. That is, generate a sequence of 100 random numbers from the set $\{1,\ldots,6\}$. Call this sequence $X_1,\ldots,X_{100}$. Plot the histogram of $X_1,\ldots,X_{100}$, with bin centers $\{1,\ldots,6\}$. Do not use a for-loop in your code. Submit your plot.

(b) Repeat (a) by drawing the dice 10000 times.

(c) Draw another dice 100 times. Call this sequence $Y_1,\ldots,Y_{100}$. Let $Z_i = X_i + Y_i$ for $i = 1,\ldots,100$. Plot the histogram of $Z_1,\ldots,Z_{100}$. Submit your plot.

(d) Repeat (c) by drawing the dices 10000 times.

(e) Using the histogram found in (d), find the probability that $4 < Z_i \leq 7$.

(f) In (c)-(d), Z_i is a sum of two random variables X_i and Y_i. What if we sum more random variables? That is, $Z_i = X_i^{(1)} + X_i^{(2)} + \ldots + X_i^{(K)}$. Let $K = 10$. Plot the histogram of $\{Z_1,\ldots,Z_{10000}\}$. Submit your histogram. Pay attention to the bin centers.

(g) Repeat (f) by setting $K = 100$. Plot the histogram of $\{Z_1,\ldots,Z_{10000}\}$. Submit your histogram. Pay attention to the bin centers.

Please put your plots after this page.

E. Probability of $4 < Z_i \leq 7$: 0.416