ENG-101 Intro Computing Engineers

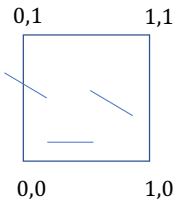
Due: 1 December 2021 at the start of class

Question 1 (25 Points)

Write a well-documented MATLAB script hmwk10Q1.m to estimate π by repeatedly tossing N sticks of length L onto a square grid with distance D between the lines. The experiment is named after the philosopher Buffon. Note that $D > L$ in the experiment. Derive an estimate for π using the equation below, where C is the number of sticks that crosses the line. Prepare a stem figure hmwk10Q1.fig that depicts your estimate of π as the number of sticks tossed changes from $N = 10, 100 \ldots, 1{,}000{,}000$.

Grading: 15 Points for *hmwk10Q1.m* and 10 Points for *figure of* π.

$$\pi \approx \frac{2LN}{DC}$$



$D = 1$
$L = 1/2$
$C = 1$
$N = 3$
$\pi \approx \frac{2LN}{DC} = 3$

Question 2 (25 Points)

Write a well-documented MATLAB script hmwk10Q2.m to estimate e by repeatedly shuffling a deck of playing cards N times and counting the number of times there is a derangement D. A derangement occurs when none of the playing cards are in the same position after shuffling the deck as before. Prepare a stem figure hmwk10Q2.fig that depicts your estimate of e as the number of sticks tossed changes from $N = 10, 100 \ldots, 1{,}000{,}000$.

$$e \approx \frac{N}{N-D}$$

Grading: 15 Points for *hmwk10Q2.m* and 10 Points for *estimate of e*.