ESE603 - Simulation Modeling & Analysis (Assignment #1)

Summer Semester, 2020 M. Carchidi

Problem #1 (10 points) - A Probability Problems

a.) (**5 points**) Suppose that $X \sim U[0,1)$, $Y \sim U[x,1)$ and $Z \sim U[0,1)$, use 5000 Monte-Carlo simulations to estimate the probability that Z lies between X and Y. For 5 points extra credit, compute the exact probability that Z lies between X and Y.

b.) (**5 points**) Suppose that $X \sim U[0,1)$, $Y \sim U[0,1)$ and $Z \sim U[0,1)$, use 5000 Monte-Carlo simulations to estimate the probability that Z lies between X and Y. For 5 points extra credit, compute the exact probability that Z lies between X and Y.

Problem #2 (10 points) - Another Probability Problems

Suppose that $X \sim U[0,1)$, $Y \sim U[x,1)$ and $Z \sim U[y,1)$, use 5000 Monte-Carlo simulations to compute the probability that Z is less than or equal to α for values of α in the range $0 < \alpha < 1$. For 5 points extra credit, compute, as a function of α, the theoretical probability that Z is less than or equal to α for any $0 < \alpha < 1$.

Problem #3 (10 points) - Another Probability Problems

Suppose that the ends of a line segment (X_L, Y_L) and (X_R, Y_R) are chosen so that $X_L \sim U[0,1)$, $Y_L \sim U[0,1)$, $X_R \sim U[0,1)$ and $Y_R \sim U[0,1)$ and suppose that the center (X_C, Y_C) and radius R of a circle are chosen so that $X_C \sim U[0,1)$, $Y_C \sim U[0,1)$ and $R \sim U[0,1)$. Use 5000 Monte-Carlo simulations to estimate the probability that the line segment lies inside the circle.
