

Assignment 1

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Download all python codes from

<https://github.com/Taha-Adeel/AI1103/tree/main/Assignment%201/codes>

and latex-tikz codes from

<https://github.com/Taha-Adeel/AI1103/tree/main/Assignment%201>

The python code for the pdf is available in

<https://github.com/Taha-Adeel/AI1103/blob/main/Assignment%201/codes/pdf.py>

1 PROBLEM (4.13)

In a musical chair game, the person playing the music has been advised to stop playing the music at any time within 2 minutes after she starts playing. What is the probability that the music will stop within the first half-minute after starting?

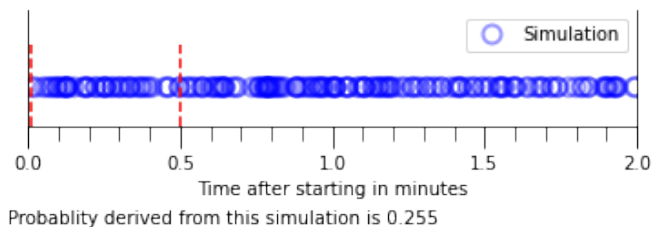
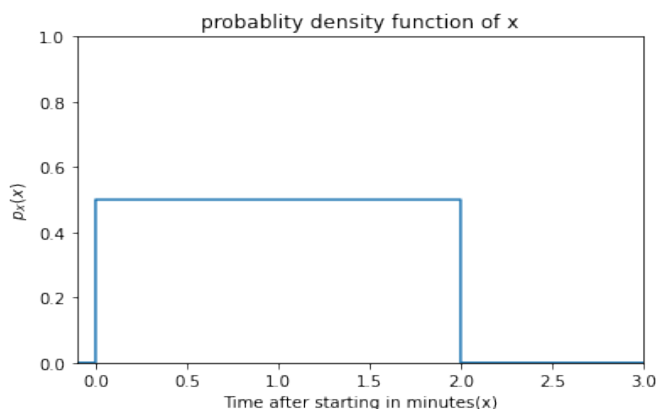
2 SOLUTION (4.13)

Let the random variable $X \in \mathbb{R}^+$ represent the time between starting the music and stopping in minutes. For a uniform probability distribution, the Probability Density Function(pdf) is given by

$$p_X(x) = \begin{cases} \frac{1}{b-a} = \frac{1}{2} & \text{if } 0 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases} \quad (2.0.1)$$

The probability that the music will stop within the first half-minute after starting

$$\Pr(X = x \mid 0 \leq x \leq 0.5) = \int_0^{0.5} \frac{1}{2} dx = \frac{1}{4} = 0.25 \quad (2.0.2)$$



The python code for the simulation is available in

<https://github.com/Taha-Adeel/AI1103/blob/main/Assignment%201/codes/Assignment1.py>

The python code generates 200 uniform random points in time that are less than 2 minutes and checks for the number of points in time that are within the first half-minute. The ratio of this is close to 0.25, which is the theoretical value. Note that each time the code is run, the ratio will change, but it will still be close to 0.25