Coding Exercise answers

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1 Introduction

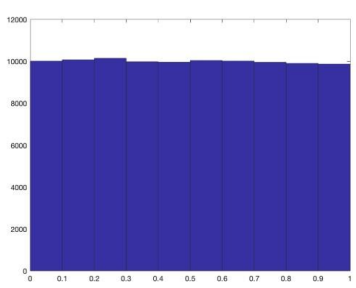
This document consists the flow of answers and figures to the problems provided in the coding exercise. Seven MATLAB scripts along with a live notebook visualizer has been submitted as a part of this coding assignment. The results of each of these scripts and their images have been shared in this document.

2 Uniform Random Variable

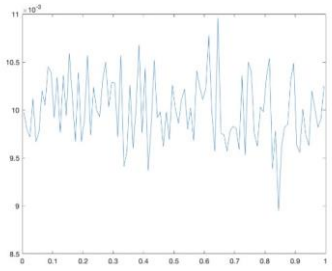
The file uniform.m generates 100,000 data points between 0 and 1 generated using the uniform random variable function. The probability density function has been calculated by partitioning the histogram into 100 clusters and finding the probability that a point exists in this cluster. The probability density functions, and the histogram are present in the notebook. (Fig1). The mean and variance come out to be very close to the actual mean and variance. They are not exact as we have taken discrete intervals to approach a continuous random variable problem. Mean and Variance analysis have been done in uexp.m.

3 Normal Random Variable

The file normal.m generates 100,000 data points between 0 and 1 generated using the normal random variable function. The probability density function has been calculated by partitioning the histogram into 100 clusters and finding the probability that a point exists in this cluster. The probability density functions, and the histogram are present in the notebook. (Fig2). The mean and variance come out to be very close to the actual mean and variance. They are not exact as we have taken discrete intervals to approach a continuous random variable problem. Mean and Variance analysis have been done in nexp.m .

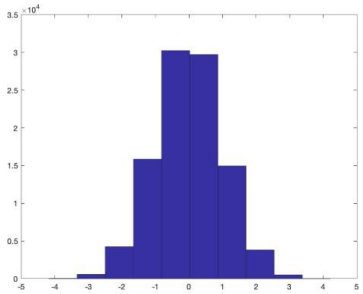


(a) Histogram

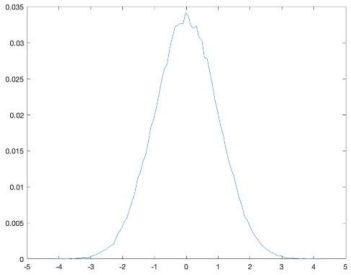


(b) PDF

Figure 1: Sampling of Uniform Random Variable



(a) Histogram

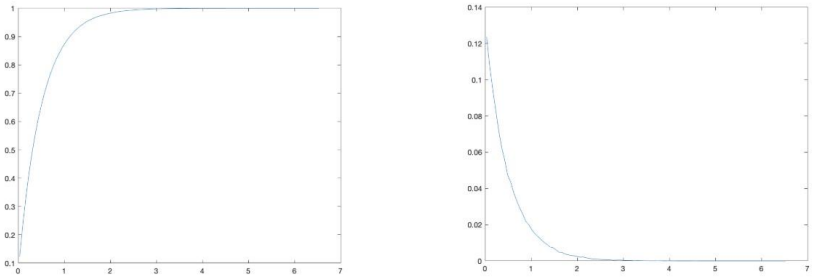


(b) PDF

Figure 2: Sampling of Normal Random Variable

4 Exponential Random Variable

The file p3.m generates 100,000 data points between 0 and 1 generated using the uniform random variable function. These random variables have been mapped to another real number space using the exponential random variable function. The CDF has been calculated by cumulatively adding the cluster probabilities. The CDF and PDF have been presented in (Fig3). The functions associated with CDF and PDF are cdf.m and pdf.m respectively. The value of lambda used is 2.



(a) CDF (b) PDF

Figure 3: Sampling of Normal Random Variable

5 Conclusion

In this coding exercise, we analysed the process of division of continuous random variable problem into countably infinite discrete interval problem. Furthermore, we analysed the process of creating a new random variable from an existing random variable by mapping the uniform random variable to another real space.