

EECS240: Random Processes

Computer Project #1

Due Feb. 11, 2021

Write computer programs for the following projects. Include your approach and the results of your programs in your report (only pdf is accepted). Also, you should submit an electronic version of your programs such that I can run them.

1. Generate $n=100$ i.i.d Bernoulli Random Variables (RVs) with parameter $P = 0.3$
 - Generate some samples of the sum of these n RVs (You will need several sets of n Bernoulli RVs).
 - Draw the probability density function (PDF) of the sum.
 - Approximate the sum variable with a Gaussian RV and draw the corresponding PDF.
 - Produce the same figure for different n 's and compare them.
2. Generate $n=100$ i.i.d Poisson RVs with parameter $\lambda = 0.3$
 - Generate some samples of the sum of these n RVs.
 - Draw the PDF of the sum.
 - Approximate the sum variable with a Gaussian RV and draw the corresponding PDF.
 - Produce the same figure for different n 's and compare them.
3. Generate CDF of a Gaussian RV with mean 2 and variance 3 from a uniformly distributed random variable in $[0, 1]$.
4. Generate two RVs; one binomial with parameters $(6, 0.3)$, and the other one a Bernoulli with $P=0.4$. Then verify the law of large numbers by calculating the sample means.
5. Estimate the mean of X^2 , where X is a zero-mean, unit-variance Gaussian RV.