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Random signal analysis I (ECE673)
Assignment 1

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The due date for this assignment is Wednesday Jan. 25

Please provide detailed answers and attached figures from your computer simulations.

1. (Problem 2.4) Write a MATLAB program in order to lend evidence to the following conjecture: the sum of a sufficiently large number of uniformly distributed random variables is approximately Gaussian distributed. Toward this end, the MATLAB code has to estimate the probability density function (i.e., evaluate the histogram) of the random variable

$$X = \sum_{i=1}^{12} \left(U_i - \frac{1}{2} \right),$$

   where U_i are independent random variables uniformly distributed between zero and one. Such random variables U_i can be generated by the command *rand* (i.e., a vector of 12 such random numbers is obtained by *rand(12,1)* and their sum is computed by using the command *sum*). Plot the estimated histogram (use a reasonable bin size) and compare it with the Gaussian distribution

$$p_X(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}x^2 \right).$$

   Please include the MATLAB code and the graph.

2. (Problem 3.21) A die is tossed that yields an even number with twice the probability of yielding an odd number. What is the probability of obtaining an even number, an odd number, a number that is even or odd, a number that is even and odd?

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