1. Consider a random variable (RV) given by

where and are two independent Gaussian RVs. Both have zero mean and unit variance. In this problem you are required to find the pdf of using two methods:

1. Using the method described in section 5.4 under one function case (See example 5.4-2).
2. Using the Jacobian method presented in section 5.4 under multiple function case. Here you need to add an auxiliary RV denoted by with another transformation function. Then, find the joint pdf of and using the Jacobian method. The desired pdf is the marginal pdf .
3. Two independent Gaussian RVs and with zero means and unit variances are linearly transformed to generate two correlated Gaussian RVs and with zero mean and variances and and correlation coefficient equals. If the transformation matrix is what are the values of , and ?
4. What is the correlation coefficient of bivariate Gaussian RVs and if you know that a linear transformation, *T*, generates two independent Gaussian RVs and, both with zero mean and unit variance, where .
5. Consider the experiment of throwing a die to define three random processes. Explain your answers.
6. Let  where *R* is exponentially distributed with *a*=0 and *b*=10.

a) Derive the expressions of both the cdf and the pdf of *X*(*t*).

b) What is the expression of the pdf when cos(*ωt*)=0?

1. ={} is a discrete-time random process that consists of a sequence of independent and identically distributed (i.i.d.) RVs , where is a RV representing the outcome of the process at time instant . The i.i.d. assumption means that all RVs have the same distribution. The process formed by the sequence is referred to as an i.i.d. random sequence. Is a stationary random process? Show your work.
2. Consider the sum process S[n, where is an i.i.d. random sequence. Is S[n a stationary random process?