**Problem 1. Sum of two random variables**

Two independent uniform random variables: X and Y. The pdf of X is 1 when 0x1 and the pdf of Y is 1 when -0.5y0.5. Find the pdf of X+Y.

**Problem2. rv correlation**

x1, x2, x3 are zero mean Gaussian random variables with STD=4. Let x1 and x2 be independent and x3= a\*x1+b\*x2. Find the constants “a” and “b” such that the correlation between x1 and x3 is 0.3. What is the correlation between x3 and x2?

**Problem3. Uniform Random Variable**

A random variable x is uniformly distributed in the interval [5 10].

What is the pdf of x?

What is the CDF of x?

What is the pdf of y=3\*x+10?

**Problem4. rms delay spread (exponential distribution)**

A continuous impulse response (Delay profile) is given as: *d(t), t≥0*

Define the normalized delay power profile:



which play a role similar to the pdf in random variable. Note that  and

.

The weighted mean time delay is



The weighted root-mean-square (rms) Delay Spread is



# Proof that if the normalized delay power profile is



Both weighted mean delay and rms delay spread is T.

**Problem5 Unifrom**

1. Let x be a random variable uniformly distributed between 0 and 1. Generate 1000 x’s. If n(k) represents the number of x’s such that k\*0.1>x≥ (k-1)\*0.1, plot n(k) with k=1,2,3,…,10.

(hint: use rand and hist commands in matlab)

HW4-6. Rayleigh

Let y be a Rayleigh distributed random variable with standard deviation σy=5. Generate 3000 y’s. If n(k) represents the number of y’s such that k>y≥ k-1, plot n(k) with k=1,2,3,…,30. What is the number of y’s with y≥30?

(hint: y=sqrt(x1^2 + x2^2); where x1 and x2 are independent normal variables. Use randn and hist)