Not required to be submitted. Review before the final exam.

# AV314 - Assignment 9

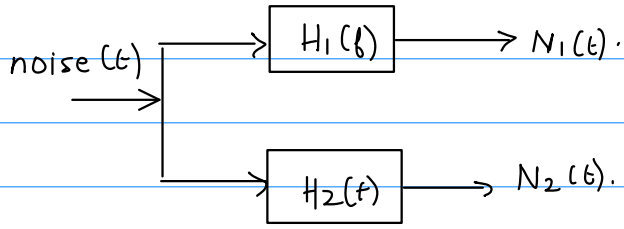
(Note that this assignment will have some programming questions too).

1) Let X be a discrete random variable with pmf as shown in the following table.

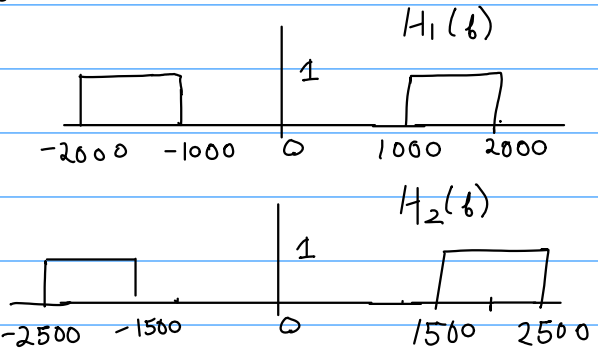
| $x$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| $P_X(x)$ | 0.1 | 0.2 | 0.3 | 0.4 |

Simulate 1000 independently drawn observations / samples / realizations of this random variable using Matlab.

2) Suppose we have a receiver which is receiving just noise as shown:




- $H_1(f)$ and $H_2(f)$ are two bandpass filters with frequency responses as shown below.




- noise (t) is an additive white Gaussian process with power spectral density $= N_0/2$.

What are the PSDs of $N_1(t)$ and $N_2(t)$? What is the joint distribution of $N_1(t)$ and $N_2(t)$ at any time $t$?

3) Do problems 5.51, 5.52, 5.53 from the textbook (Upamanyu Madhow's).

4) Try to derive the SNR expressions for all the AM schemes on your own.