ELEG 5693 Assignment # 9

1. Consider a three-tap discrete-time channel

$$H(z) = 0.2 + 0.5z^{-1} + 0.3z^{-2} \tag{1}$$

   (a) What value of μ is needed for the cyclic prefix to elminate ISI?

   (b) Write the channel matrix, $\mathbf{H}$, in the form of a circular matrix. Please use $N = 8$.

   (c) Find the matrix $\mathbf{QHQ}^H$, where $\mathbf{Q}$ is the normalized DFT matrix.

2. Consider an OFDM system with $N = 128$ subcarriers and $\mu = 6$ cyclic prefix. The time domain sampling period is $T_s = 0.5$ μs.

   (a) What is the OFDM symbol period T_N?

   (b) What is the maximum delay spread that can be handled by the system?

   (c) Find the data rate if the modulation is 64QAM, and the code rate is 1/2.