ECN-619: Wireless Communication Systems **ECE Dept. IITR**

Assignment 1: Capacity of wireless channels (Part-1)

Date: August 05, 2021 Submit by: August 10, 2021

Problem 1: Capacity plot for AWGN single-input single output (SISO) channel. Remember the capacity is $C = \log_2(1 + \text{SNR})$.

Problem 2: Generate an independent and identically distributed Gaussian noise sequence with mean μ and variance σ^2. Plot and verify that the sequence has a Gaussian distribution.

Problem 3: Capacity plot for fixed single-input multiple-output (SIMO) channel. Remember the capacity is $C = \log_2(1 + \|\mathbf{h}\|^2\text{SNR})$, where $\mathbf{h} \sim \mathcal{CN}(0, 1) \in \mathbb{C}^{N_R \times 1}$. Assume $N_R = 5$ receive antennas.

Note: Vary the SNR from -10 dB to 40 dB in steps of 2 dB. Plot capacity versus SNR (dB), where SNR (dB) $= 10 \log_{10}(\text{SNR})$.