Please use MATLAB to help you solve these problems, check answers, etc.

**Problem 1.1** Introduction to Wireless Communications
Identify the cellular and PCS spectrum


**Problem 1.2** dB in Communications
If a signal with a power level of 10 mW is inserted onto a transmission line (cable or wire) and the measured power some distance away is 5 mW, what is the loss on this line in dB?

**Problem 1.3** dB in Communications
Decibels are useful in determining the gain or loss over a series of transmission media. Consider a series in which the input is at a power level of 4 mW, the first medium is a transmission line with a 12 dB loss, the second medium is an amplifier with a 35 dB gain, and the third medium is a space with a 80 dB loss. What is the net gain (or loss) of the entire transmission media? What is the output power in dBW?

**Problem 1.4** Probability
In an experiment to monitor three calls, the probability mass function (PMF) of \( N \) the number of voice calls, is

\[
P_N(n) = \begin{cases} 
0.2 & n = 0 \\
0.5 & n = 1 \\
0.2 & n = 2 \\
0.1 & n = 3 \\
0 & \text{otherwise}
\end{cases}
\]

(a) Find \( E[N] \), the expected number of voice calls

(b) Find \( P[N < 3] \), i.e., the probability that the number of calls is less than 3.

(c) Find \( P[1 < N \leq 3] \).