Question 1: BER Analysis of M-QAM

Construct an M-QAM Simulink model using the following steps:

- Configure the Bernoulli Binary Generator:

- Sample time: 1×10^{-6} (1 Mbps data rate)
- Samples per frame: 3000

- Start with $M = 4$ (i.e., QAM). Use the `Bit to Integer` block with Number of Bits per Integer set to $\log_2(M)$.
- Modulate using an M-QAM Modulator. Set normalization to Average Power and visualize the constellation.
- Use the AWGN Channel block with:
  - Mode: `Eb/N0`, set to 10 dB
  - Bits per symbol: $\log_2(M)$
- Demodulate using an M-QAM Demodulator followed by Integer to Bit block.
- Use the Error Rate Calculator to compute BER (stored in the first element of `ErrorVec`).
- Compare the simulated BER with theoretical values for M-QAM at 10 dB `Eb/N0`. Verify similarity to BPAM.
- Repeat for $M = 4, 16, 64$:
  - Capture constellation diagrams.
  - Plot and compare theoretical vs. simulated BER.
- Sweep `Eb/N0` from 3 dB to 15 dB in 2 dB steps. Plot BER curves for all $M = 4, 16, 64$.

Question 2: BER Analysis of M-PSK

Develop an M-PSK Simulink model with the same simulation parameters:

- Configure the Bernoulli Binary Generator:
  - Sample time: 1×10^{-6}
  - Samples per frame: 3000
- Start with $M = 4$ (i.e., QPSK). Use the `Bit to Integer` block as before.
- Use the M-PSK Modulator and observe the constellation.
- Set AWGN Channel blocks Bits per Symbol to $\log_2(M)$, `Eb/N0` to 10 dB.
- Compute and compare theoretical vs. simulated BER for QPSK. Validate similarity with BPSK.
- Repeat for $M = 4, 8, 16$:
  - View constellations
  - Plot theoretical and simulated BER
- Sweep `Eb/N0` from 3 dB to 15 dB (step size = 2 dB). Plot BER curves for all $M = 4, 8, 16$.
- Compare 16-QAM and 16-PSK BER curves over the same `Eb/N0` range. Discuss your observations.