1. Correlator and matched filter

   Download from Canvas the Matlab script `mappings_corr_MF2.m` and run it with your student ID[1]. The script plots waveforms associated with three mapping schemes: Polar NRZ, AMI RZ and unipolar Manchester in three figures.

   (a) Sketch carefully or attach these three figures to your solution.

   (b) Use the figures to verify that correlator and matched filter outputs yield the same result when sampled at multiples of the pulse duration.

2. Simulation of BPSK and 4-PAM

   Download from Canvas the Matlab script `sim_BPSK_4PAM_AWGN.m` and run it with your student ID[1]. The resulting graph compares theoretical and simulated bit error rates of binary communication using BPSK (polar mapping) and 4-PAM mapping.

   (a) Sketch carefully or attach the graph to your solution

   (b) Verify that 4-PAM mapping requires 7 dB more energy than BPSK to achieve the same error performance while doubling the bit transmission rate

3. Performance of M-PAM in terms of signal energy

   Download from Canvas the Matlab script `PeMPAM_EsNo.m` and run it. The script will produce plots of the average bit error probability versus signal energy-to-noise ratio, E_s/N_0 in dB. Attach the figure to your solution.

TERM PROJECT

The theme this semester is ***Communication channel models***. These models are used in standardization activities in organizations such as IEEE, DVB, 3GPP, ETSI and O-RAN. There are many types of channels such as wireless (e.g., personal, local, metropolitan area), optical (fiber or free space), satellite, broadcasting, cellular, etc.

   I. Team members

   List the names of four students in the team. (If you cannot find a team, the instructor will assign you to one.)

   II. Project summary

   Prepare a one-page description of the topic your are interested in. Include: (a) Title, (b) team members, (c) a 200-300 word summary, and (d) 2 to 3 references from peer-reviewed papers or books. *No links to websites are allowed as references.*

TIME SCHEDULE FOR EXPERIMENTAL DEMOS

Experimental demos with software radios will be conducted by project teams in the RF Communications lab. Due to the limited number of radios, you must attach in a separate page *all days and one-hour time slots* when *all* final project team members will be available to use a pair of computers connected to radios in the lab.

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[1]This ensures that each student gets a unique simulation result.