EE 571 DIGITAL COMMUNICATIONS I (142)

Assignment # 5

1. [Proakis, 5th], Problem 4.9
2. [Proakis, 5th], Problem 4.15
3. [Proakis, 5th], Problem 4.23
4. [Proakis, 5th], Problem 4.24
5. [Proakis, 5th], Problem 4.26
6. [Proakis, 5th], Problem 4.42
7. Consider a 4-PAM system with Gray mapping. Evaluate the exact bit error probability.
   Hint: Consider the bit error probability for the first and second bit separately, and then average over the two bit error probabilities. To find the error probability for each bit, condition on the transmitted symbols, and use the total probability law.
8. Consider the signal constellation shown in Fig. 1, where nine equally probable 2-dimensional signals are used for transmission over an AWGN channels with noise variance σ^2 per dimension.
   a) Find the decision regions for the MAP rule. **Hint:** use the rotational invariance property of the signal constellation under AWGN channel.
   b) Evaluate the probability of symbol error as a function of d, l_1, , l_2, θ.

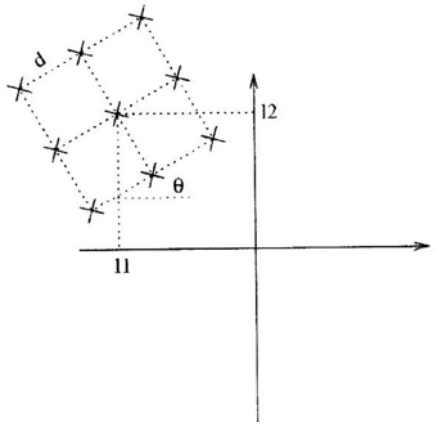

Fig. 1: Signal constellation of Problem 8.

Note: Please copy this and sign on each H.W. assignment:

I testify to Allah that I will not refer to the solutions of the assignments of EE 571 by any means and in any form and from any source, before I submit the assignment to my instructor