Cairo University
Faculty of Engineering
Giza Campus

Department of Communications
and Computer Engineering
ELC N316 – Spring 2012

PROBLEMS SET III

EXACT CALCULATION OF THE PROBABILITY OF ERROR

Problem (1)* This problem investigates symbol error probability for a 4-ary communications scheme. In each case, the symbol constellation is modulated on a unit energy pulse shape and transmitted across a complex AWGN channel with spectral density N_0.

a) Determine the symbol error probability for the constellation {$-3A, -A, A, 3A$} which is sketched as:
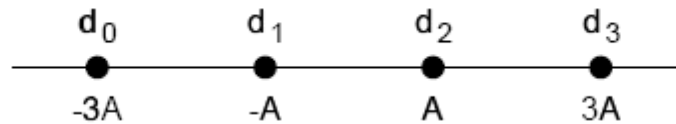
b) Determine the symbol error probability for the constellation {$0, 2A, 4A, 6A$} which is sketched as:

c) Comment on your results. Explain why the symbol error probability (SEP) in parts (a) and (b) are the same (if they are the same) or explain why one SEP is better than the other (if they are different).

Problem (2-10) (Lathi, 3rd edition) 14.3-1, 14.3-2*, 14.3-5 (**Hint:** Since the symbols are not equiprobable, start with the MAP rule and follow the inequalities till you get the decision regions), 14.3-7(b only)*, 14.4-2(a, b), 14.4-3, 14.4-4(a)* (**Hint:** It *might* not be wise to use Gram-schmidt procedure without thinking.), 14.4-5(a)*, 14.4-6(b, c).

- (*) Starred problems are HW problems.