2008 Advanced Coding Theorem HW#3   Due date :2008.06.09

1. Do set partitioning for 2x16QAM (only do one branch for each level).
2. Consider two coded sequences S_1 and S_2 for 3x8PSK

$$\text{If } \underline{S_1} \oplus \underline{S_2} = \left\{ \begin{pmatrix} \vdots \\ 0 \\ 0 \\ 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} \vdots \\ 1 \\ 0 \\ 1 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} \vdots \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} \vdots \\ 1 \\ 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \vdots \\ 0 \\ 0 \\ 1 \\ 1 \\ 0 \end{pmatrix} \right\} ,$$

   Which set partitioning has the largest SED of $\underline{S_1}$ and $\underline{S_2}$ among those possible set partitioning for 3x8PSK?
3. Assume that it is desired to transmit binary data using a 16-dimnsional shaped uncoded constellation at the rate of 7bits/2D. The 2D circular constellation is partitioned into M regions, let M≤8, and shaping CER of 1.5 is acceptable.
   (1) To obtain the shaping gain, what's the maximum value of M? For this M, what's the number of input information bit per shaping block?
   (2) For M=6, do shell mapping if $R_0 = 41$
       i. Show $g_2(p)$ p, $g_4(p)$ for $p = 0\sim3$, $g_8(p)$ for $p = 0\sim3$ and $Z_8(p)$ for p=1~4.
       ii. What's the total cost?
       iii. What's the cost of each symbol?

The rule of priority: