QUIZ 2

1) Solve the following problem using BPT method

$$\max_{\mathbf{x}} 2x_0 + x_1(x_1 - 2) + 4x_2(x_2 - 1) + 4x_3 + 4x_4 + 4x_5 + 5x_6 + 5x_4x_5 + 2x_6x_7$$

$$s.t. \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 & 1 \end{bmatrix} \mathbf{x} = \begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix}$$

$$\mathbf{x} \in \{0, 1\}^8$$

2) Solve the following problem using both BPT and CT methods. Can you solve it using both methods? If yes, comment on times taken by two algorithms and compare the final result; if not, explain why

$$\begin{bmatrix} 2 & 0 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 2 & 1 & 0 & -3 & 1 & 0 \\ 0 & -1 & 1 & 3 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 2 & 0 & 0 & 2 & 1 \end{bmatrix} \mathbf{x} = \begin{bmatrix} 2 \\ 1 \\ 2 \\ 1 \end{bmatrix}$$

$$\mathbf{x} \in Z^8$$

Bonus question:

3) Try converting the above question 2 to a binary integer problem. Describe how to convert the integer variables to binary variables.
Note: This will be later helpful in formulating QUBOs