Homework 5: Please send them at BE office by lunch time Friday 11 Nov 2016

1. Given $\underline{\mathbf{A}} = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$

(a) Find $\underline{\mathbf{A}}^{-1}$ and show that your answer is correct.

(b) If $\underline{\mathbf{A}}^{-1}\underline{\mathbf{x}} = \begin{bmatrix} -1 \\ 2 \\ -3 \\ 4 \end{bmatrix}$, find $\underline{\mathbf{x}}$.

(c) Given $\underline{\mathbf{B}}^{\mathbf{T}} - 2\underline{\mathbf{I}} = 2\underline{\mathbf{A}}^{-1}$, determine $\underline{\mathbf{B}}$.

2. Use the **Lagrange Multiplier method** to determine the critical point of a three-variable function $f(x, y, z) = x^2 + y^2 + z^2$

subjected to $x + y = 2$

and $x + z = 2$

Solve the system of linear questions using **matrix**.

3. (a) If $\underline{\mathbf{A}} = \begin{bmatrix} 2 & c & c \\ c & c & c \\ 8 & 7 & c \end{bmatrix}$, for which three numbers *c* is the matrix **not invertable**, and **why not**?

(b) If $c = 0$ and $\underline{\mathbf{A}}\underline{\mathbf{x}} = \begin{bmatrix} -2 \\ 0 \\ 1 \end{bmatrix}$, find the solution of this system of linear equations. If there are infinite solutions, give your answer in **vector form**.