## Quiz 1

## **Problems**

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MASTOREF QUIZ 1.
                                                                                                          S#: 20170058 Name: Keonwoo Kom
#1. The given linear system can be transformed into the following form:
      as an augmented matrix. By a sories of elementary row operations on
     the anguarted matrix above,
           \begin{bmatrix} 7 & 1 & 8 & 20 \\ 3 & 2 & -8 & 5 \\ 2 & 1 & 5 & 12 \\ 1 & 1 & -2 & 4 \end{bmatrix} \xrightarrow{E(1,4)} \begin{bmatrix} 1 & 1 & -2 & 4 \\ 3 & 2 & -8 & 5 \\ 2 & 1 & 5 & 12 \\ 7 & 1 & +2 & 20 \end{bmatrix}
                                   E(1,2;-3), E(1,3;-2), E(1,4;-3)
\longrightarrow
0 - 1 - 2 - 7
0 - 1 - 9 + 4
0 - 6 - 90 - 8
                                                    E(2,1;-1), E(2,3;1), E(2,4;6) \begin{bmatrix} 1 & 0 & -4 & | & -3 \\ 0 & 1 & 2 & | & 7 \\ 0 & 0 & 11 & | & 11 \\ 0 & 0 & 34 & | & 34 \end{bmatrix}
E(3;\frac{1}{11}) \begin{bmatrix} 1 & 0 & -4 & | & -3 \\ 0 & 1 & 2 & | & 7 \\ 0 & 0 & 1 & | & 1 \\ 0 & 0 & 34 & | & 34 \end{bmatrix}
                     E(3,1,4), E(3,2;-2), E(3,4;-34)
\xrightarrow{\longrightarrow} \begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}
    Thus the given syste of linear equations is consistent with the unique solution X = \begin{bmatrix} 7 & 5 & 1 \end{bmatrix}^T.
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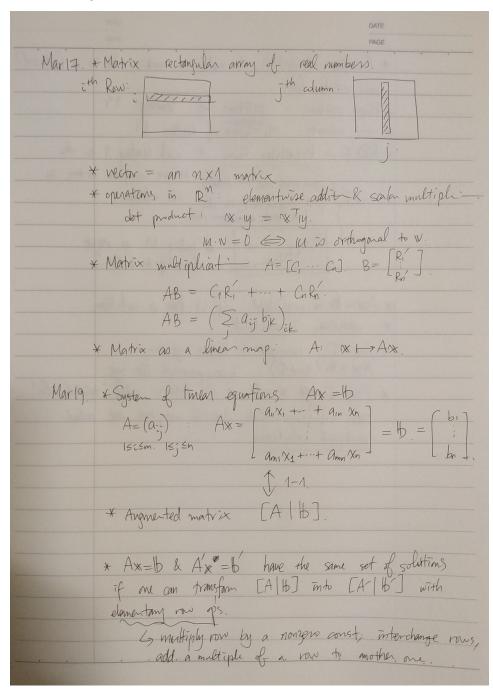
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#2. The given option can be translated into the fillewing argumented matrix:

$$\begin{bmatrix} 2 & 3 & 1 & 2 & 1 & 5 \\ 1 & 1 & 4 & 5 & 1 & 2 \\ 3 & -1 & +3 & 1 & 6 \end{bmatrix}$$
By a series of elementary now operations,

$$\begin{bmatrix} 2 & 3 & 1 & 2 & 1 & 5 \\ 1 & 1 & 4 & 5 & 1 & 2 \\ 3 & -1 & -4 & 3 & 6 \end{bmatrix} = \underbrace{E(1,2)}_{3 & -1} \begin{bmatrix} 1 & 1 & 4 & 5 & 1 & 2 \\ 2 & 3 & 1 & 2 & 5 & 5 \\ 3 & -1 & -4 & 3 & 6 \end{bmatrix} = \underbrace{E(1,2,-2)}_{3 & -1} \underbrace{E(1,3,-3)}_{3 & -1} \begin{bmatrix} 1 & 1 & 4 & 5 & 1 & 2 \\ 1 & 1 & 4 & 3 & 6 \end{bmatrix} = \underbrace{E(3,-4)}_{0 & 1} \underbrace{\begin{bmatrix} 1 & 1 & 4 & 5 & 1 & 2 \\ 0 & 1 & -7 & -9 & 1 & 1 \\ 0 & 1 & 4 & 3 & 6 \end{bmatrix}}_{0 & 1 & -7 & -9 & 1 & 1 \\ 0 & 1 & 4 & 3 & 6 \end{bmatrix} = \underbrace{E(2,3)}_{0 & 1} \underbrace{\begin{bmatrix} 1 & 1 & 4 & 5 & 1 & 2 \\ 0 & 1 & 4 & 3 & 6 \\ 0 & 1 & 4 & 3 & 6 \end{bmatrix}}_{0 & 1 & 2 & 2 & 2 \\ 0 & 1 & 1 & 4 & 3 & 6 \\ 0 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0$$

## Summary



* Gaussian elemination to make a matrix be in a (reduced)  now echelon form.  * Pivot partian. position of leading 1's.  * Column: The index of leading 1's.  * RREF = Row echelon form t each leading 1 is the  serio nows are at bottom. Imagine nonzero on try in  first nangero on try is 4  in each so nonger now.  [2]  Life in each so nonger now.  [4]  * AX = B is consistent if it has a solution.  * otherwise, inconsistent  * AX = O homogeneous incon system.  AX = B (B+O): inhomogeneous in sign.  * AX = O as a solution, alled "trivial solh".  Other solutions which AX = O may has are alled nontrivial solutions.	DATE
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