

## OR-1 Homework-2

Due: 2018/3/20 (Tue.), in class

(1 – 3) Show the nonsingular matrices that perform (when premultiplied on both sides of the equations) the following row operations on the problem below ( $Ax = b$ ). Each subproblem is independent

$$\begin{array}{rccccrcr} 2x_1 & -x_2 & +5x_3 & +x_4 & +3x_5 & = & 10 \\ x_1 & -x_2 & & +5x_4 & -3x_5 & = & 30 \\ x_1 & +x_2 & +2x_3 & +2x_4 & & = & 20 \\ & x_2 & -3x_3 & +x_4 & +2x_5 & = & 50 \end{array}$$

1. Change the locations of the rows of the coefficient matrix A as follows.  
 $1 \rightarrow 3, \quad 2 \rightarrow 4, \quad 3 \rightarrow 2, \quad 4 \rightarrow 1$
2. Multiply  $(-1/2)$  to the second row and add it to the third row.
3. Multiply  $(1/2)$  to the first row to obtain the new first row. Next, multiply  $(-2)$  to the first row and add it to the second row.
4. Consider the system of linear equations obtained from the above system after eliminating the first equation. Then, use elementary row operations to express the variables  $x_1, x_2,$  and  $x_3$  which are dependent variables, using the variables  $x_4$  and  $x_5$  which are independent variables.  
Also, obtain the inverse of the submatrix which corresponds to the variables  $x_1, x_2,$  and  $x_3$ . Then show that the same expression can be obtained by multiplying the inverse matrix on both sides of the initial equations.
5. Text p. 9, #1.3
6. Text p. 9, #1.4