SECTIONS 2.5 & 2.6 **Math 2050 Worksheet** WINTER 2018

For practice only. Not to be submitted.

1. Use Gaussian elimination to determine if each of the following matrices is invertible. If so, show its inverse.

   (a) $A = \begin{bmatrix} 4 & -8 & 0 \\ 12 & -23 & 0 \\ 0 & 20 & 4 \end{bmatrix}$

   (b) $B = \begin{bmatrix} 1 & 0 & 2 \\ 3 & 1 & 0 \\ 1 & -1 & 8 \end{bmatrix}$

   (c) $C = \begin{bmatrix} 1 & 0 & 3 & -2 \\ -4 & 1 & -8 & 8 \\ 6 & 0 & 19 & -12 \\ 0 & -2 & -8 & 1 \end{bmatrix}$

2. (a) Solve the system
$$\left. \begin{array}{rcl} x \quad\quad - \quad 3z &=& 1 \\ 5x + \tfrac{1}{3}y - 15z &=& 3 \\ -x + y + 4z &=& -6 \end{array} \right\}$$
   by writing it in the form $A\mathbf{x} = \mathbf{b}$ and computing $\mathbf{x} = A^{-1}\mathbf{b}$.

   (b) Briefly explain why the method of part (a) would not work for the system
$$\left. \begin{array}{rcl} x \quad\quad - \quad 3z + 4w &=& 1 \\ 5x + \tfrac{1}{3}y - 15z - w &=& 3 \\ -x + y + 4z - 7w &=& -6 \end{array} \right\}$$

3. Express $A = \begin{bmatrix} 4 & -6 \\ 1 & -1 \end{bmatrix}$ as a product of elementary matrices.

4. Solve the system
$$\left. \begin{array}{rcl} 5x + 2y - z &=& 12 \\ x \quad\quad + 4z &=& -13 \\ -2x \quad\quad + z &=& -1 \end{array} \right\}$$
   by first carrying out an LU-factorization of the matrix of coefficients A.