

**Quiz 2**

**Instructions:** Each question is worth 10 points. You may use any notes or books but you must work individually. The only computation aid which you may use is MATLAB, unless otherwise indicated. Make sure to write clearly and justify your answers.

(1.) Let  $A = \begin{pmatrix} 5 & 10 & -1 \\ 0 & 3 & 5 \\ 1 & 2 & 1 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 3 & 5 \\ 0 & 0 & -3 \end{pmatrix}$ .

Find three elementary matrices  $\mathcal{E}_1, \mathcal{E}_2$  and  $\mathcal{E}_3$  such that  $\mathcal{E}_3\mathcal{E}_2\mathcal{E}_1A = B$

(2.) Find the inverse of  $\begin{pmatrix} 1 & -2 & 6 \\ -4 & 9 & -23 \\ -1 & 2 & -5 \end{pmatrix}$ . DO NOT USE MATLAB

(3.) Find the  $L - U$  factorization of  $\begin{pmatrix} 12 & 0 & 8 \\ -3 & 3 & -1 \\ -3 & -1 & 2 \end{pmatrix}$ . DO NOT USE MATLAB

(4.) Let  $A = \begin{pmatrix} 3 & 2 \\ 3 & -2 \end{pmatrix}$ .

- (a.) Compute  $A - \lambda I_2$  where  $I_2$  is the  $2 \times 2$  identity matrix and  $\lambda$  is an unknown.
- (b.) Find  $d(\lambda) = \det(A - \lambda I)$ . Note that this will be a polynomial in  $\lambda$ .
- (c.) Find all values of  $\lambda$  such that  $d(\lambda) = 0$ .
- (d.) If  $d(\lambda)$  is the polynomial found in (b.), compute  $d(A)$ . (ie. substitute the matrix  $A$  for the unknown  $\lambda$  in this polynomial and use MATLAB).