Write two Matlab functions. The first should perform Gaussian elimination on the system $Ax = b$. The inputs are the matrix $A$ and the vector $b$. The outputs should be an upper triangular matrix $U$ and the transformed vector $^\wedge b$. Your function should only use trivial pivoting. The second function should implement back substitution with inputs an upper triangular matrix $U$ and a vector $^\wedge b$. The output should be the solution $x$ of $Ux = ^\wedge b$.

Use the Matlab diary command to generate a file with your results for the following questions. For each part use your two functions, the Matlab command $A\backslash b$, and inv($A$)$\times b$ to compute the solution to $Ax = b$. For each calculation, use the Matlab $\div$ops command to check the efficiency.

1. Generate a random 7 by 7 matrix for $A$ and a random 7 by 1 vector for $b$.

2. Use your program on:

$$
\begin{bmatrix}
0 & 3:02 & 1:05 & 2:53 & 1 \\
1 & 4:33 & 0:56 & 1:78 & ^\wedge b \\
2 & 0:83 & i:05 & 1:47 & 3:38 \\
\end{bmatrix}
$$

3. Repeat with a slightly perturbed coefficient

$$
\begin{bmatrix}
0 & 3:02 & 1:05 & 2:54 & 1 \\
1 & 4:33 & 0:56 & 1:78 & ^\wedge b \\
2 & 0:83 & i:05 & 1:47 & 3:38 \\
\end{bmatrix}
$$

You must submit your diary file along with listings of your two functions. You must do the work yourself. If I find papers that are similar then no credit will be given to those papers.