CS3081: Computational Mathematics
Assignment 2

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Problem 1:

For the Gaussian LU decomposition, I wrote a MATLAB function that takes a square matrix A and return two other matrices of the same order, L and U such that L is in lower triangular form and U in upper triangular form, and that L x U = A. The algorithm basically transform the input matrix to upper triangular form, saving the pivot coefficient in an identity matrix that will become L. While U is the starting matrix in upper triangular form after doing Gauss elimination, L is just the matrix of the coefficient used.

Code in “LU_decomp.m”

Problem 2:

Using the eig function in MATLAB, we get two matrices. One diagonal which includes all the eigenvalues of the input matrix, and another square one with all the eigen vectors which each column of vector corresponding to the eigen value in the previous matrix.

With that, we can easily see that there is only one eigen value for which the vectors are all of the same sign, and with which we can easily order the teams. And see that team 2 and 5 are the best and 1 the worst.

Problem 3:

We can transform the growth equation y = be^(x*m), to its linear form: ln(y) = m*x + ln(b), after which we can use the least-squares regression summation to find values for m and ln(b), and we found m = 0.011988 and ln(b) = -16.8746, from that we get: b = e^(ln(b)) = 4.6931e-08 and if we round m to 0.012, we can plug these number into our starting exponential equation with the date 1985 and find that the population of China was around 1038 millions.