Name: Jack
Student ID: D1166506

To complete this assignment, I separate this program to 3 parts. First of all, I declare and initialize the required variables, then print the required sentences and input the variables. For convenience, I declare the functions min, max, and LU_decompose as well. At the same time, set the random seed to 0.

In the LU_decompose function, I use the loops and equations as instructions. For the sake of calculating the banded area, I use some condition to restrict the end of the loop like min(n-1 , k+s), min(n-1 , k+r), and min (n-1 , min (i+s , k+s)). For the reasons why the restriction is in this type, when the loop is not close to the edge, n-1 will be greater than k+s; however, when the loop is close to the edge, n-1 will be less than k+s, so the matrix can remain the shape as required and so on.

Next, generate and print the matrix A, then call the function LU_decompose to generate the matrices L and U.

At the end, print the matrices L and U, then verify the correctness of the function LU_decompose. After the previous step, print the corresponding sentences according to the variable flag.