1 . Solve the below Ax = b problem using Gauss-Elemination with pivoting and diagonal dominant part.

Matrix A =

[52   93   15   72   61   21   83   87   75   75   88   24
3   22   53   2   88   30   38   2   64   60   21   33
76   58   22   89   49   91   59   42   92   60   80   15
62   62   47   0   51   55   64   3   51   7   21   73
39   18   4   89   60   14   9   90   53   2   84   92
60   71   44   8   47   35   78   81   36   50   4   2
6   54   4   54   93   63   18   90   44   34   74   62
14   95   48   15   72   78   87   1   40   85   80   82
53   24   26   89   60   41   29   15   45   65   89   71
9   88   1   8   88   63   11   81   8   35   35   33
5   41   28   7   73   72   12   34   33   48   23   62
88   37   99   44   86   91   35   65   99   47   78   3]

Matrix b is a constant vector, and the value is the last digit of your roll number + 1.

a. Find the Determinant of the upper singular matrix formed.
b. Also print the Upper singular matrix (Augmented form)
c. Put a counter in the program to count the total number of operations (addition, subtraction, multiplication, and division) done to solve this problem.

2. **Find the unknown molar flow rates D,B,D1,B1,D2 and B2 using Guass Jordan by solving Ax=b equation.**

a. The compositions values are given as:

D1 : 7% Xylene
4% Styrene
54% Toluene
35% Benzene

B1 : 18% Xylene
24% Styrene
42% Toluene
16% Benzene

D2 : 15% Xylene
10% Styrene
54% Toluene
21% Benzene

B2 : 24% Xylene
65% Styrene
10% Toluene
1% Benzene

D1

C-2

D

15% Xylene
25% Styrene
40% Toluene
20% Benzene

C-1

F = 70 kmol/hr

B1

D2

B

C-3

B2