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Advanced Numerical Method

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Modeling of a special physical phenomenon results into the following system of equations:

$$x_{i-1} - 2x_i + x_{i+1} = i \times ab$$

in which ab is the first two digits of your *Student ID*, after removing it's first three digits. For example, if $Sdutent\ ID = 9107532$ then $ab = 75$. In this problem, x_0 is always equal to zero; i.e. $x_0 = 0$ and $x_n = CN$; where CN is your class number. Suppose that we want to solve a 5×5 system of equations (Note that $i = 0$ and $i = 6$ are known and $i = 1$ to $i = 5$ are unknown)

1. Make the system of equations and write it down in compact form.
2. Obtain the *Gauss Elimination* subroutine form *Numerical Recipes* and solve the problem.
3. Obtain the inverse of the matrix using *Gauss Elimination* method.
4. Determine the *Condition Number* of your system.
5. Solve the system using *Jacobi*, *Gauss–Seidel* and *SOR* methods.