1.

In class discussion :   using the Σ method, find the time complexity of the following algorithm

Algorithm *GaussianElimination*(A[0..n-1,0..n])

//Implements Gaussian elimination of an *n*-by-(*n*+1) matrix *A*

for $i \leftarrow$ 0 to *n* - 2 do

   for $j \leftarrow i$ + 1 to *n* - 1 do

      for $k \leftarrow i$ to *n* do

         A[j,k] $\leftarrow$ A[j,k] - A[i,k] * A[j,i] / A[i,i]

Find the efficiency class and a constant factor improvement.

In-class discussions

2. Prove by induction that for all n≥1

$$1 + 4 + 7 + \cdots + (3n - 2) = \frac{n(3n - 1)}{2}.$$

3. Show by proving by induction that $n! > 3^n$ for $n \geq 7$.

4. Using the principle of mathematical induction, prove that $1^2 + 2^2 + 3^2 + \ldots + n^2 = 1/6[n(n + 1)(2n + 1)]$ for all $n \in N$.

In- class discussion

5. By using mathematical induction prove that the given equation is true *for all positive integers.*

$1 \times 2 + 3 \times 4 + 5 \times 6 + \ldots + (2n - 1) \times 2n = \dfrac{n(n+1)(4n-1)}{3}$

6. Prove by induction that $1^2 + 2^2 + 3^2 + \cdots + (2n)^2 = \dfrac{n(2n+1)(4n+1)}{3}$ all n >= 1.

7. Prove by induction that $6^n - 1$ is divisible by 5