Cryptography and Network Security

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Assignment 9 : Euclidean and Extended Euclidean

Theory : Euclidean algorithm is used to find a GCD of 2 numbers. Extended Euclidean helps to find the inverse of the number.

Code :

```
#include <bits/stdc++.h>
using namespace std;

// Function for extended Euclidean Algorithm
long long gcdExtended(long long a, long long b, long long *x, long long *y)
{
  cout<<a<<" "<<b<<" "<<" " <<*x <<" "<<*y<<"\n";
  // Base Case
  if (b == 0)
  {
    return a;
  }
  long long q = a / b;
  long long x1 = *y;
  long long y1 = *x - q * (*y);
  long long gcd = gcdExtended(b, a % b, &x1, &y1);

   return gcd;
}

// Driver Code
int main()
{
  long long x = 0, y = 1, a, b;
  cout << "\n Enter a and  b to find GCD";
  cout << "\n a = ";
  cin >> a;
  cout << "\n b = ";
```

```
   cin >> b;

   long long g = gcdExtended(a, b, &x, &y);
   cout<<"GCD("<<a<<", "<<b<<") = "<<g<<endl;
   return 0;
 }
```

```
PS D:\Academics\Fourth Year\CNS Lab\cns lab> cd "d:\Academics\Fourth Year\CNS Lab\cns lab"
PS D:\Academics\Fourth Year\CNS Lab\cns lab> & .\"assignment9.exe"

 Enter a and  b to find GCD
 a = 1000000004

 b = 789678
GCD(1000000004, 789678) = 2
```