Number Theory Resources

Number Theory

1. Shafayater Blog: [Link]

This is a great website for learning. Try to spend time on this website to learn new topics.

2. forthright48.com : [Link]

This website almost covers all topics of number theory.

3. www.progkriya.org : [Link]

3. Number Theory : [Link]

N.B: Take your time to understand these topics. Feel free to discuss with your friend if you do not understand anything clearly.

1.Seive(): Finding primes in a range

```
//seive().cpp
#include<bits/stdc++.h>
using namespace std;

#define mx 10000010
bool flag[mx];
int primes[mx];

int seive(int n)
{
    int sq=sqrt(n);
    flag[1]=1;
    for(int i=4;i<=n;i+=2)flag[i]=1;
    for(int i=3;i<=sq;i+=2){
        if(flag[i]==0){
            for(int j=2*i;j<=n;j+=i)
                flag[j]=1;
        }
    }
    int count=0;
    cout<<"Number of primes in the range of 1 to N: ";
    for(int i=1;i<=n;i++){
        if(flag[i]==0)count++;
    }
    cout<<count<<endl;
```

```
    return count;
}
int main()
{
    int n;
    while(1){
            cin>>n;
        seive(n);
    }
}
// if N 100 Total Primes: 25
// if N 1000 Total Primes: 168
// if N 1000000 Total Primes: 78498
```

2.Number of divisor of a number N.

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

#define mx 10000010
bool flag[mx];
int primes[mx];

int seive(int n)
{
    int sq=sqrt(n);
    flag[1]=1;
    for(int i=4;i<=n;i+=2)flag[i]=1;
    for(int i=3;i<=sq;i+=2){
        if(flag[i]==0){
            for(int j=2*i;j<=n;j+=i)
                flag[j]=1;
        }
    }
    int count=0;
    for(int i=1;i<=n;i++){
        if(flag[i]==0){
            primes[count++]=i;
        }
    }
}

int divisor (int n)
{
    int sq=sqrt(n), sum=1;
    for(int i=0;primes[i]<=sq;i++){
        if(n%primes[i]==0){
```

```
            int count=0;
            while(n%primes[i]==0){
                n/=primes[i];
                count++;
            }
            //cout<<primes[i]<<' '<<count<<endl;
            sum=sum*(count+1);
        }
    }
    if(n>1){
        sum=sum*2;
    }
    return sum;
}
int main()
{
    seive(100000);
    int n;
    while(cin>>n){
        cout<<"Number of divisor of "<<n<<" are: "<<divisor(n)<<endl;;
    }
}
// 5 No Of divisor:2
// 8 No Of divisor:4
// 100 No Of divisor:9
// 568 No Of divisor:8
// 48 No Of divisor:10
```

2.Sum of divisor of a number N.

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

#define mx 10000010
bool flag[mx];
int primes[mx];

int seive(int n)
{
    int sq=sqrt(n);
    flag[1]=1;
    for(int i=4;i<=n;i+=2)flag[i]=1;
    for(int i=3;i<=sq;i+=2){
        if(flag[i]==0){
            for(int j=2*i;j<=n;j+=i)
                flag[j]=1;
        }
    }
```

```
    int count=0;
    for(int i=1;i<=n;i++){
        if(flag[i]==0){
            primes[count++]=i;
        }
    }
}

int divisor_sum (int n)
{
    int sq=sqrt(n), sum=1, p=1,s;
    for(int i=0;primes[i]<=sq;i++){
        if(n%primes[i]==0){
            p=1;
            while(n%primes[i]==0){
                n/=primes[i];
                p*=primes[i];
            }
            p*=primes[i];
            sum*=(p-1)/(primes[i]-1);
        }
    }
    if(n>1){
        p=n*n;
        s=(p-1)/(n-1);
        sum=sum*s;
    }
    return sum;
}
int main()
{
    seive(100000);
    int n;
    while(cin>>n){
        cout<<"Sum of divisor of "<<n<<" are: "<<divisor_sum(n)<<endl;;
    }
}
 // 48 Sum of Of divisor:124
//72 Sum of Of divisor:195
```