Exercise1: (using do-while)

Write a program on C++ that asks the user to enter strictly positive integers and displays their average. When you enter a negative value, the program displays ERROR and asks to reenter a value. When you enter 0, it means that the last integer has been entered. We then display the average. If the number of integers entered equals 0, NO AVERAGE is displayed.

```
-----------------------------------------------------------------
#include<iostream>
using namespace std;

int main()
{
int x, s=0,nb=0;
double average;

do
{
cout<<"Enter an integer :";
cin>>x;
  if(x>0)
  {
   s=s+x;
   nb++;}
  else
  if(x<0)
  cout<<"ERROR ";
  }
while(x!=0);

if(nb==0)
cout<<"NO NUMBER ENTERED "<<endl<<"NO AVERAGE"<<endl;
else
 {
     average=(double)s/nb;
     cout<<" The average is : "<<average<<endl;
     }

return 0;
}
```

Exercise2: (sequence 1)

Write a program on C++ that asks the user to type an integer N and calculates u_N defined by:

$$\begin{cases} u_0 = 3 \\ u_{n+1} = 3u_n + 4 \quad , \text{for } n \geq 0 \end{cases}.$$

```
#include<iostream>
using namespace std;
int main()
{
int i,u=3,N;

cout<<"Enter the value of N : ";
cin>>N;

for(i=0;i<N;i++)
u=u*3+4;

cout<<"u("<<N<<")="<<u<<endl;

return 0;
}
```

Exercise3: (sequence 2)

Write a program on C++ that asks the user to type an integer N and calculates u_N defined by:

$$\begin{cases} u_0 = 3, \quad u_1 = 2 \\ u_n = n\,u_{n-1} + (n+1)\,u_{n-2} + n, \quad \text{for n} \geq 2 \end{cases}.$$

```
#include<iostream>
using namespace std;
int main()
{
int N,u,i=0,v,w;

cout<<"Enter the value of N : ";
cin>>N;
u=3;
v=2;
if(N==0)
w=u;
else
 if(N==1)
w=v;
else
for(i=2;i<=N;i++)
{
w=i*v+(i+1)*u+i;
u=v;
v=w;
}

cout<<"u("<<N<<")="<<w<<endl;

return 0;
}
```

Exercise4: (check it is a prime number or not?)

Write a program on C++ that asks to enter an integer and that indicates whether this integer is a prime or not.

```
#include<iostream>
using namespace std;

int main()
{
int n;
bool prime=true;
int d=2;

cout<<"Please enter an integer: ";
cin>>n;

if(n<=1)
prime=false;
else
{
   while(prime==true && d*d<=n)
    if(n%d==0)
      prime=false;
    else d=d+1;
        }
if(prime)
cout<<n<<" is a prime number."<<endl;
else
cout<<n<<" is not a prime number."<<endl;

return 0;
}
```

Exercise5:

Write a program on C++ that asks the user to enter an integer N and that displays the number of prime numbers less than or equal to N.

```cpp
#include<iostream>
using namespace std;

int main()
{
int N,i,nb=0,d;
bool prime;

cout<<"Enter a positive integer N >2 : ";
cin>>N;

for(i=2;i<=N;i++)
        {
        /* Write a subprogram to check that i is prime or not? */
        prime=true;
        d=2;
        while(prime && d*d<=i)
                if(i%d==0)
                prime=false;
                else d++;

        if(prime==true)
        nb++;
        }

cout<<"The number of prime numbers <= to "<<N<<"is"<<nb<<endl;

return 0;
}
```