

While loop:

Loops are used to repeat a block/group of statements continuously until the given condition becomes false.

Loops reduce program size and improves performance.

In loops beginning and ending points are same.

Basically 2 types of loops are available.

- 1. Entry/pre controlled loops.**
- 2. Exit/post controlled loops.**

In entry control loops, condition is tested first and it is true then only statements block is executed.

Under entry control loops we are having

- i. While loop**
- ii. For loop**

In exit control loop, the statements are executed first and later condition is tested.

Under exit control loop we are having

- i. do while.**

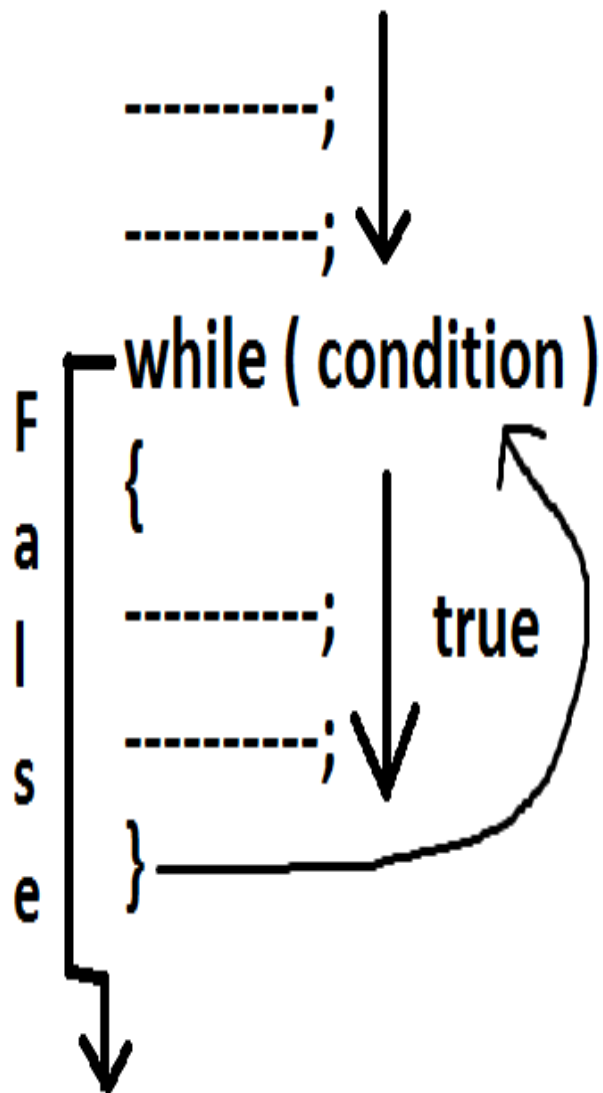
While loop:

- **while is a keyword.**
- **In while loop condition is tested first and it is true then only while block statements are executed. After executing while block statements, the program execution automatically shifted/jumped to while condition at the beginning. If it is true then once again the while block statements are repeated. Like this the**

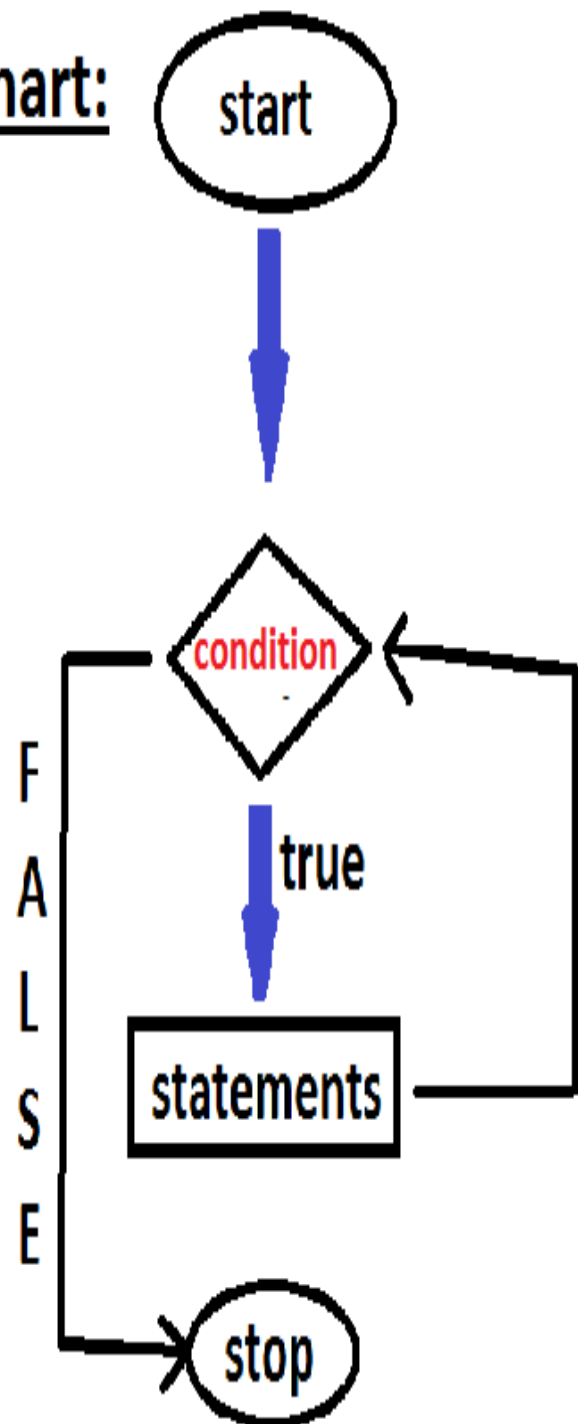
process is continued until while condition becomes false.

➤ **While is entry control loop.**

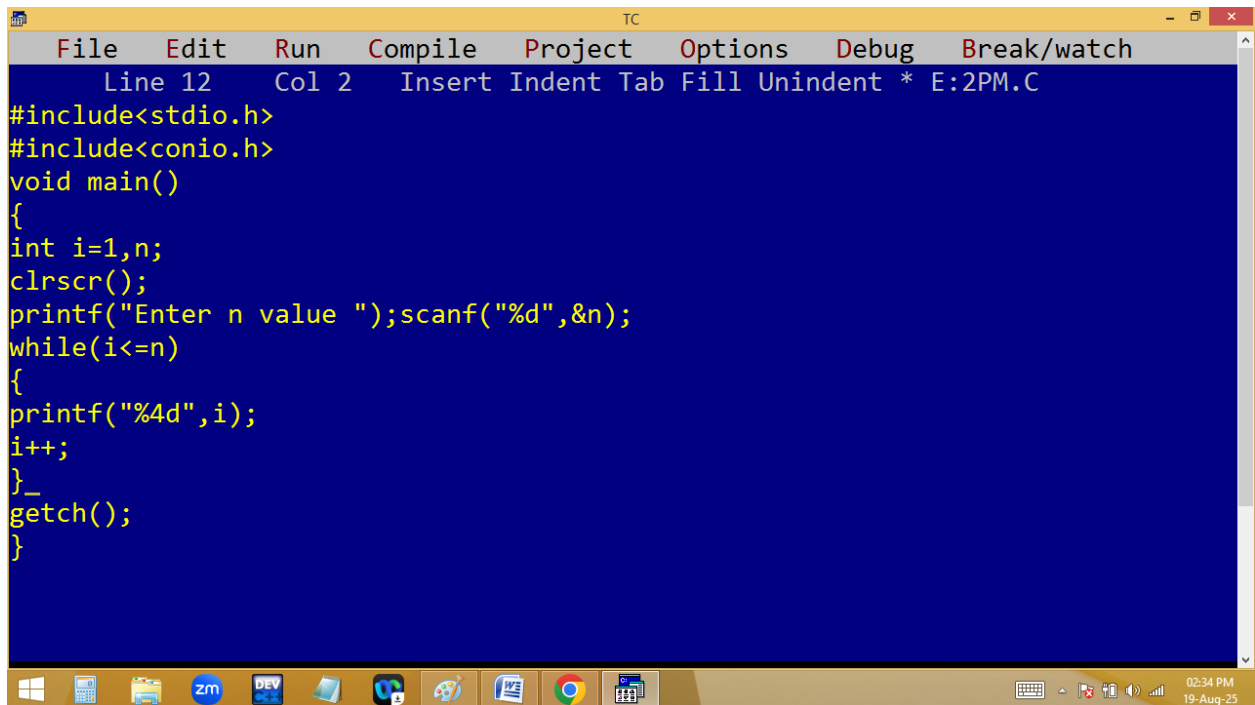
Syntax:



Flow chart:

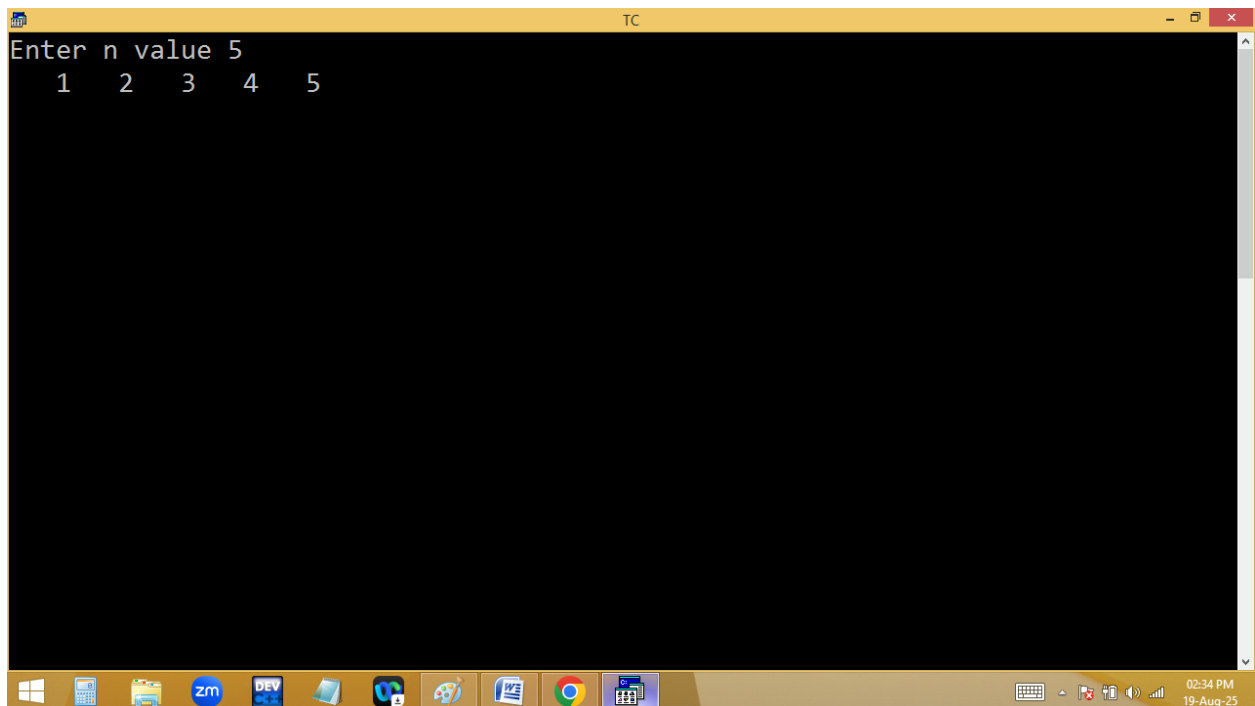


Printing 1..n numbers?



The screenshot shows the Turbo C++ (TC) IDE with a blue background. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the bottom indicates Line 12, Col 2, and the file name E:2PM.C. The code in the editor is as follows:

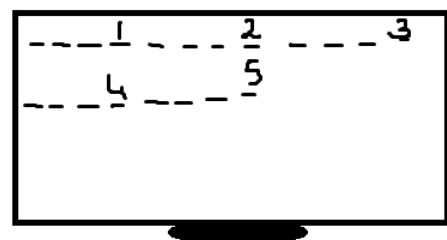
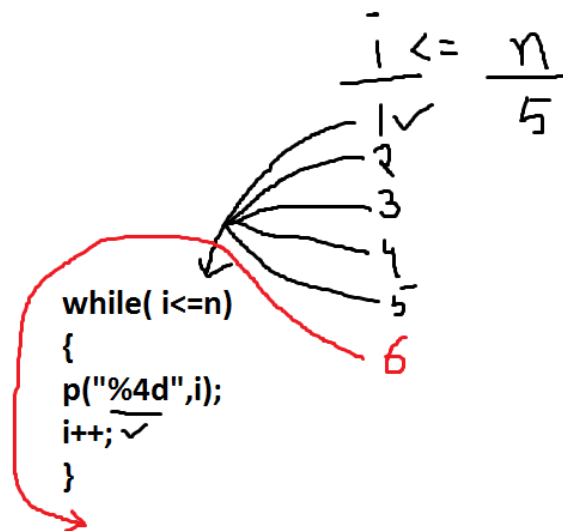
```
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(i<=n)
{
printf("%4d",i);
i++;
}_
getch();
}
```

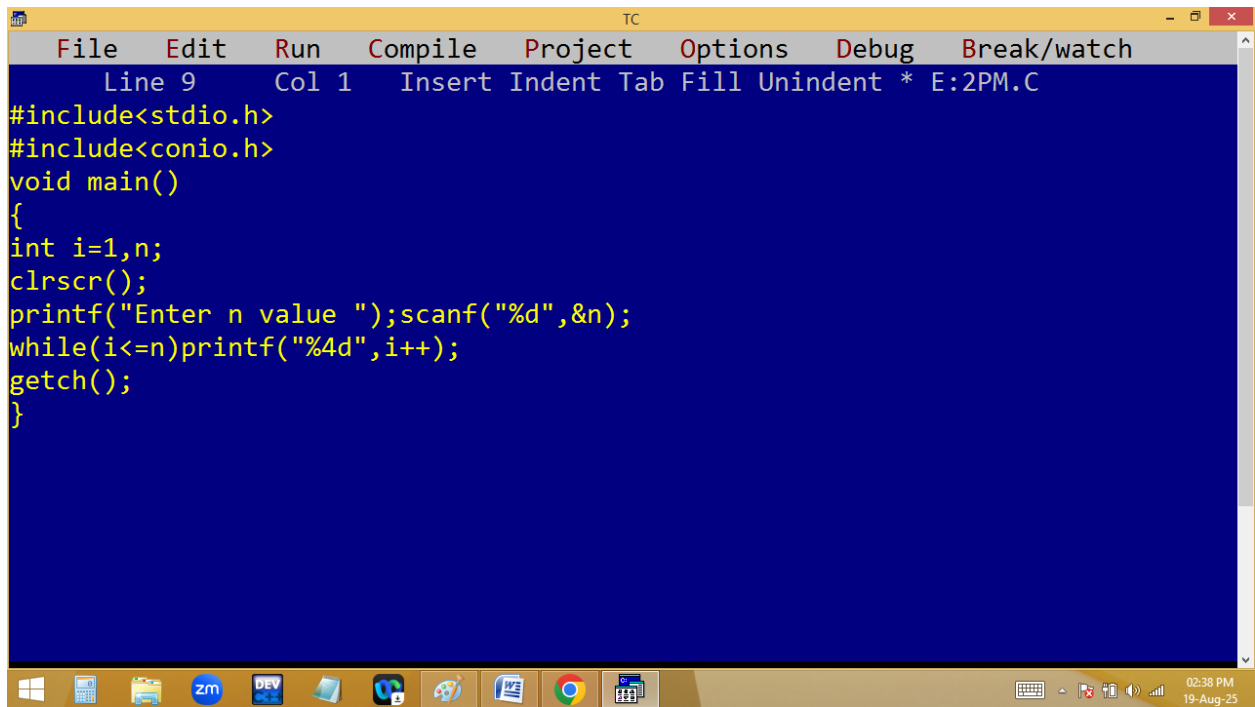


The screenshot shows the Turbo C++ (TC) IDE with a black background, displaying the output of the program. The text "Enter n value 5" is on the first line, and the numbers "1 2 3 4 5" are printed on the second line, each with a width of 4 characters as specified in the code.

```
Enter n value 5
1 2 3 4 5
```

```
TC
Enter n value 100
1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
```

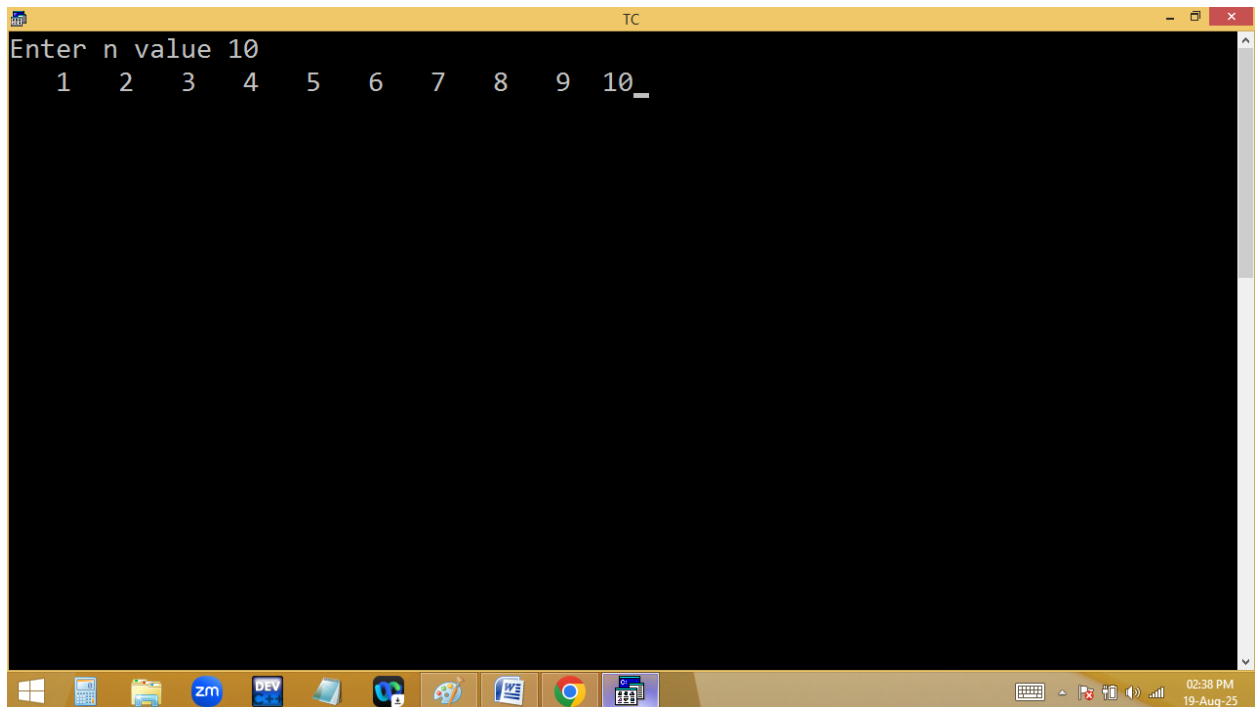




The screenshot shows the Turbo C++ (TC) IDE with a yellow title bar and a menu bar containing File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 9 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C'. The main editing area has a blue background and contains the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1,n;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(i<=n)printf("%4d",i++);
getch();
}
```

The Windows taskbar at the bottom shows various icons including the Start button, task manager, and several application icons. The system clock in the bottom right corner displays '02:38 PM 19-Aug-25'.

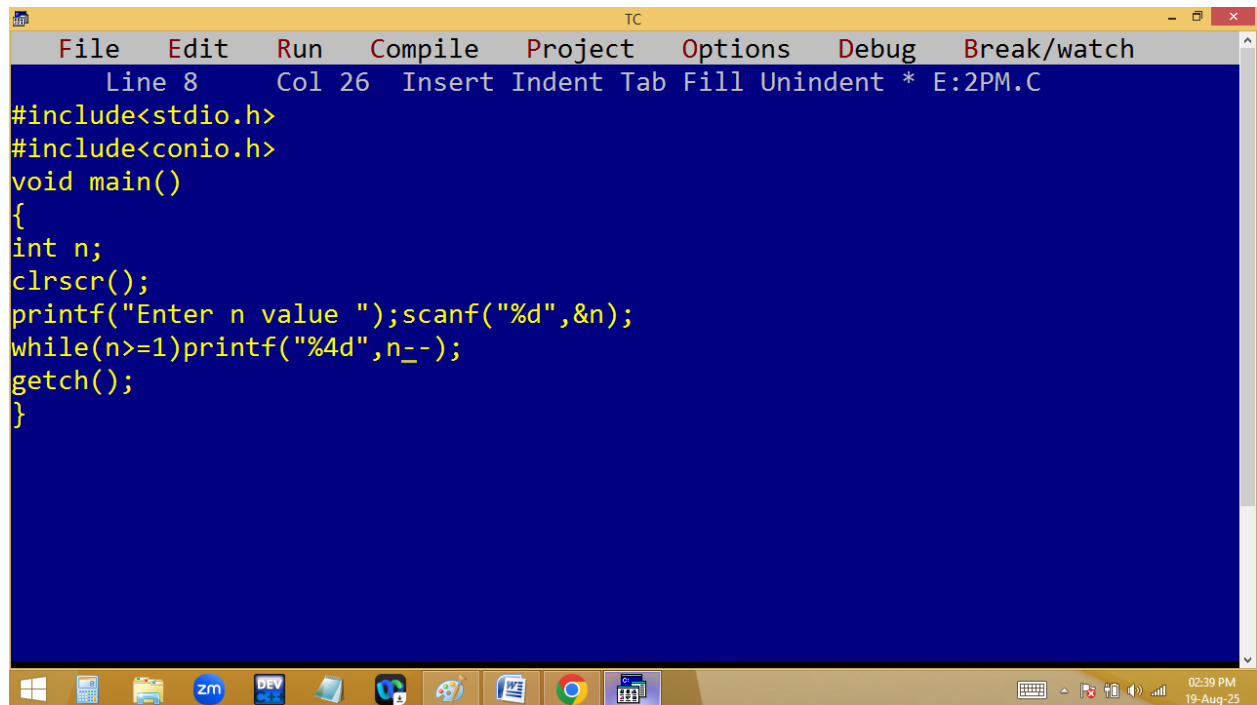


The screenshot shows the Turbo C++ (TC) IDE with the same yellow title bar and menu bar. The main editing area now has a black background and displays the program's output:

```
Enter n value 10
1 2 3 4 5 6 7 8 9 10_
```

The output shows the user has entered '10' for 'n', and the program has printed the numbers 1 through 10, each followed by a space. The underscore at the end of the line indicates the cursor's position. The Windows taskbar and system clock are identical to the first screenshot.

Printing 1..n no's in reverse order:

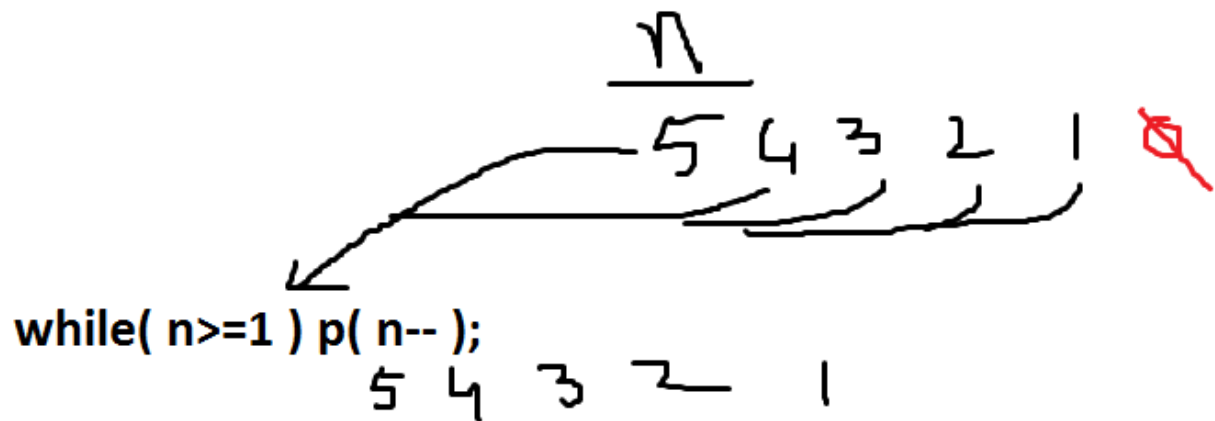


The image shows a screenshot of a Turbo C++ (TC) IDE window. The title bar reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", "Debug", and "Break/watch". The status bar at the top indicates "Line 8", "Col 26", and "Insert Indent Tab Fill Unindent * E:2PM.C". The main editing area has a dark blue background with yellow text. The code is as follows:

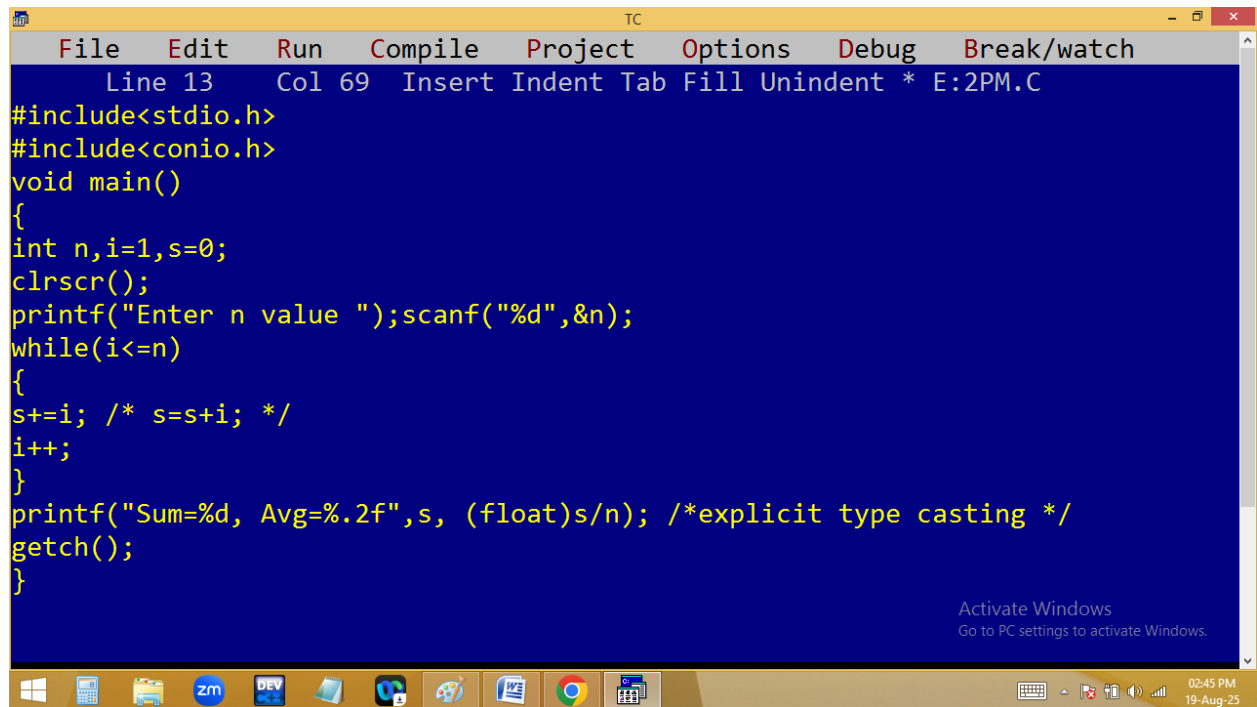
```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n;
    clrscr();
    printf("Enter n value ");scanf("%d",&n);
    while(n>=1)printf("%4d",n--);
    getch();
}
```

The Windows taskbar is visible at the bottom, showing icons for the Start menu, Task View, File Explorer, Zoom, DEV, and several other applications. The system clock in the bottom right corner shows "02:39 PM" and "19-Aug-25".


```
TC
Enter n value 10
10 9 8 7 6 5 4 3 2 1
```



Finding 1..n no's sum and avg?



The image shows a screenshot of a Turbo C++ (TC) IDE window. The title bar reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", "Debug", and "Break/watch". The status bar at the top indicates "Line 13", "Col 69", and "Insert Indent Tab Fill Unindent * E:2PM.C". The main editing area has a dark blue background with yellow text. The code is as follows:

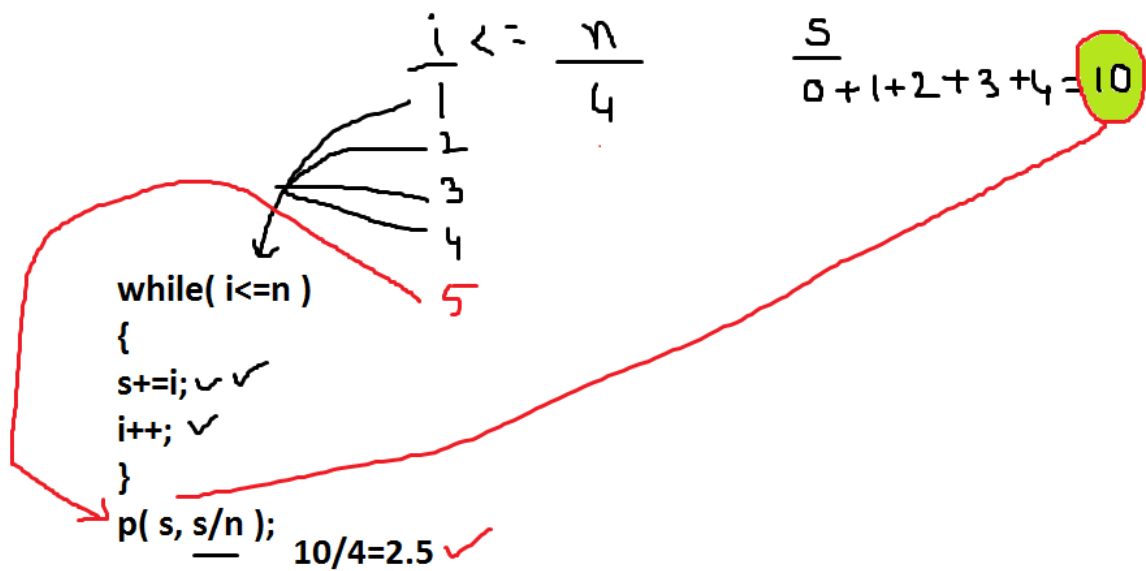
```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,i=1,s=0;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(i<=n)
{
s+=i; /* s=s+i; */
i++;
}
printf("Sum=%d, Avg=%.2f",s, (float)s/n); /*explicit type casting */
getch();
}
```

In the bottom right corner of the IDE, there is a message: "Activate Windows Go to PC settings to activate Windows." The Windows taskbar is visible at the bottom, showing icons for the Start menu, File Explorer, Zoho Mail, DEV C++, and other applications. The system tray on the right shows the time as "02:45 PM" and the date as "19-Aug-25".

```
TC
Enter n value 4
Sum=10, Avg=2.50
```

Activate Windows
Go to PC settings to activate Windows.

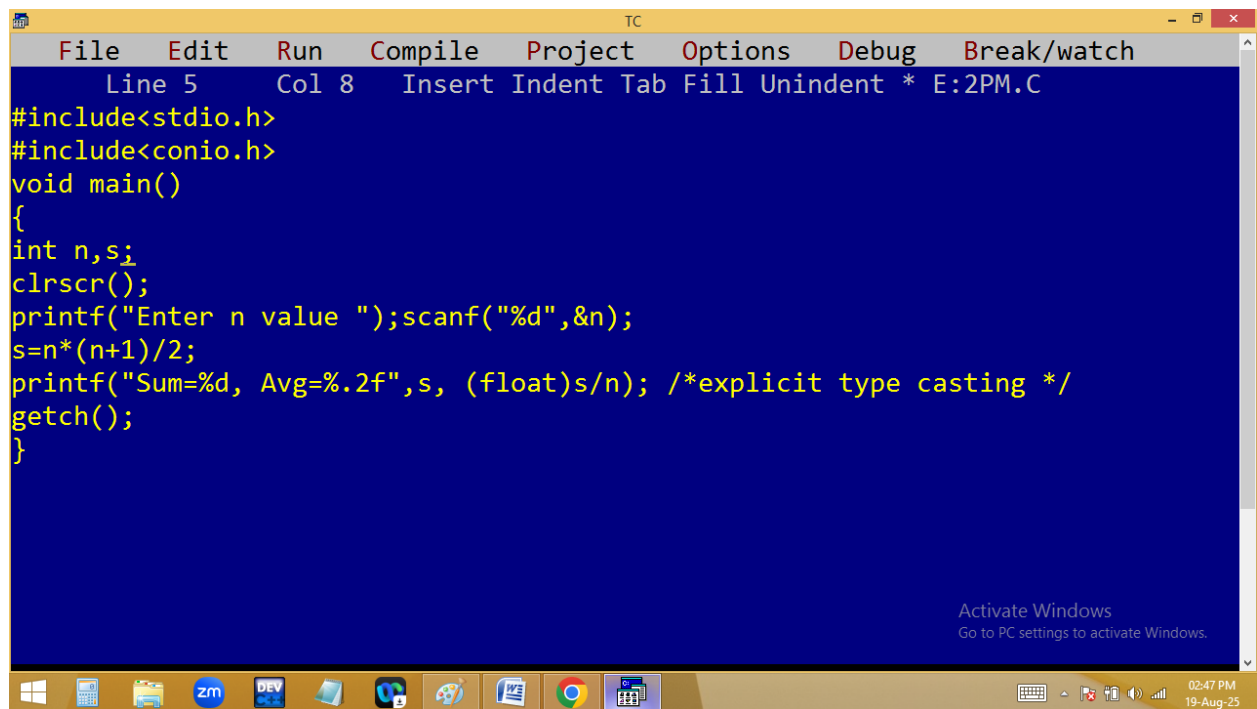
02:45 PM
19-Aug-25



Without using loop?

$$s = n*(n+1)/2;$$

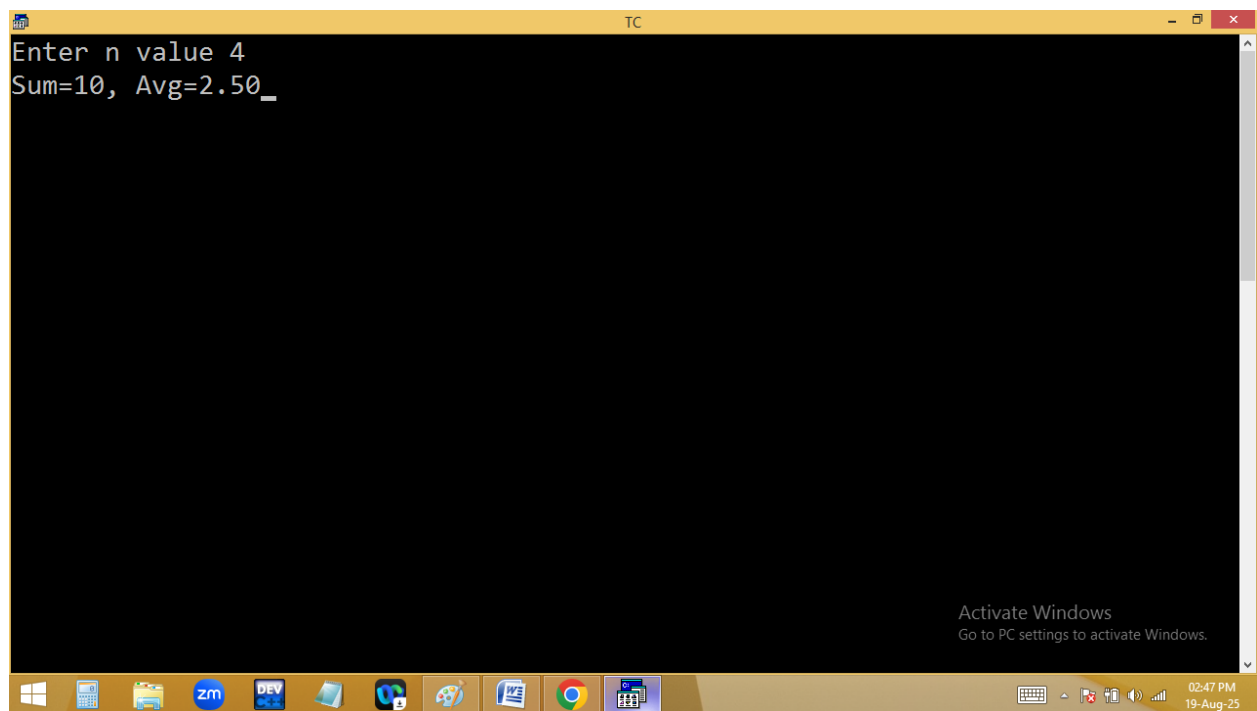
$$s = 4 * 5 / 2 = 10$$



The screenshot shows the Turbo C++ (TC) IDE with a blue background. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 5 Col 8 Insert Indent Tab Fill Unindent * E:2PM.C'. The code is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,s;
clrscr();
printf("Enter n value ");scanf("%d",&n);
s=n*(n+1)/2;
printf("Sum=%d, Avg=%.2f",s, (float)s/n); /*explicit type casting */
getch();
}
```

An 'Activate Windows' watermark is visible in the bottom right corner of the IDE window. The Windows taskbar at the bottom shows various icons and the system clock indicating 02:47 PM on 19-Aug-25.



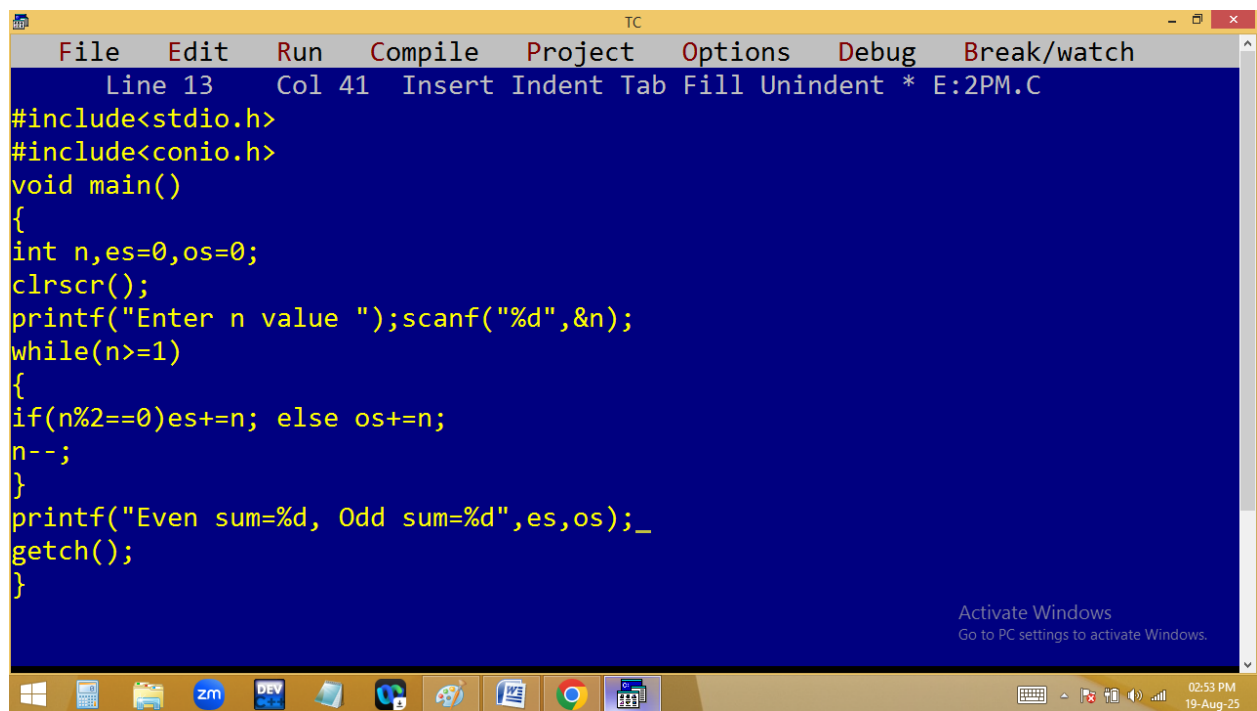
The screenshot shows the same Turbo C++ IDE window after execution. The output displayed is:

```
Enter n value 4
Sum=10, Avg=2.50_
```

The 'Activate Windows' watermark is also present in the bottom right corner. The Windows taskbar at the bottom shows the same icons and system clock as the first screenshot.

Find 1..n even, odd no's sum?

$$n=5 \begin{cases} 1+3+5=9 \\ 2+4=6 \end{cases}$$



```
File Edit Run Compile Project Options Debug Break/watch
Line 13 Col 41 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int n,es=0,os=0;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>=1)
{
if(n%2==0)es+=n; else os+=n;
n--;
}
printf("Even sum=%d, Odd sum=%d",es,os);_
getch();
}
```

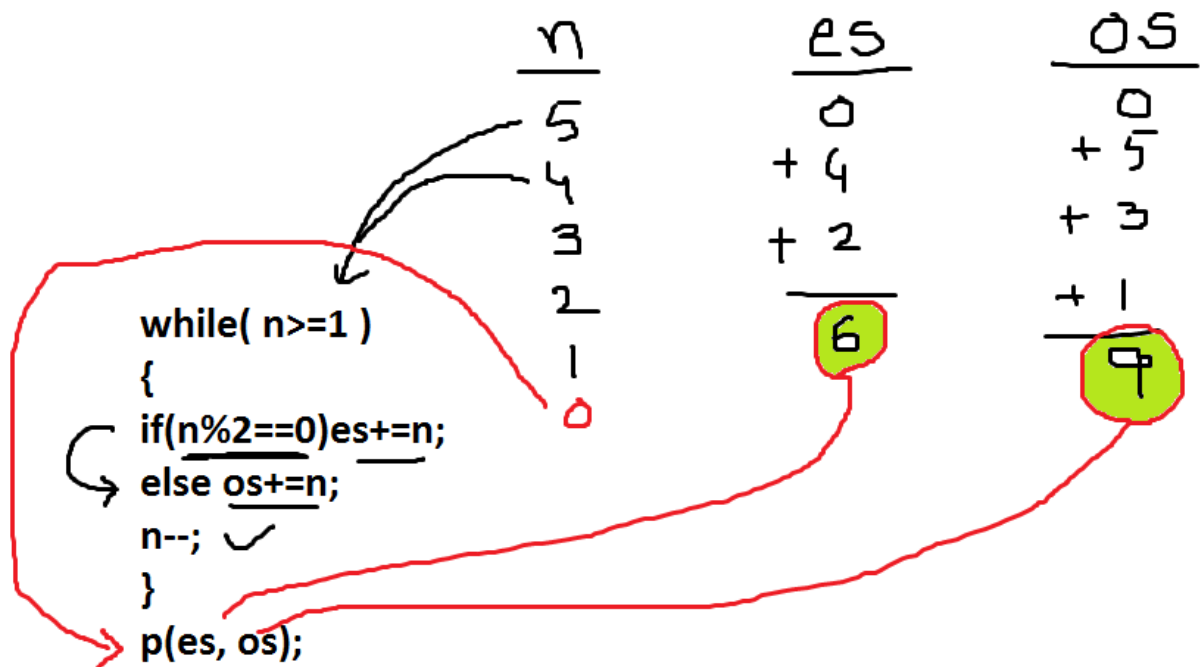
Activate Windows
Go to PC settings to activate Windows.

02:53 PM
19-Aug-25

```
TC
Enter n value 5
Even sum=6, Odd sum=9
```

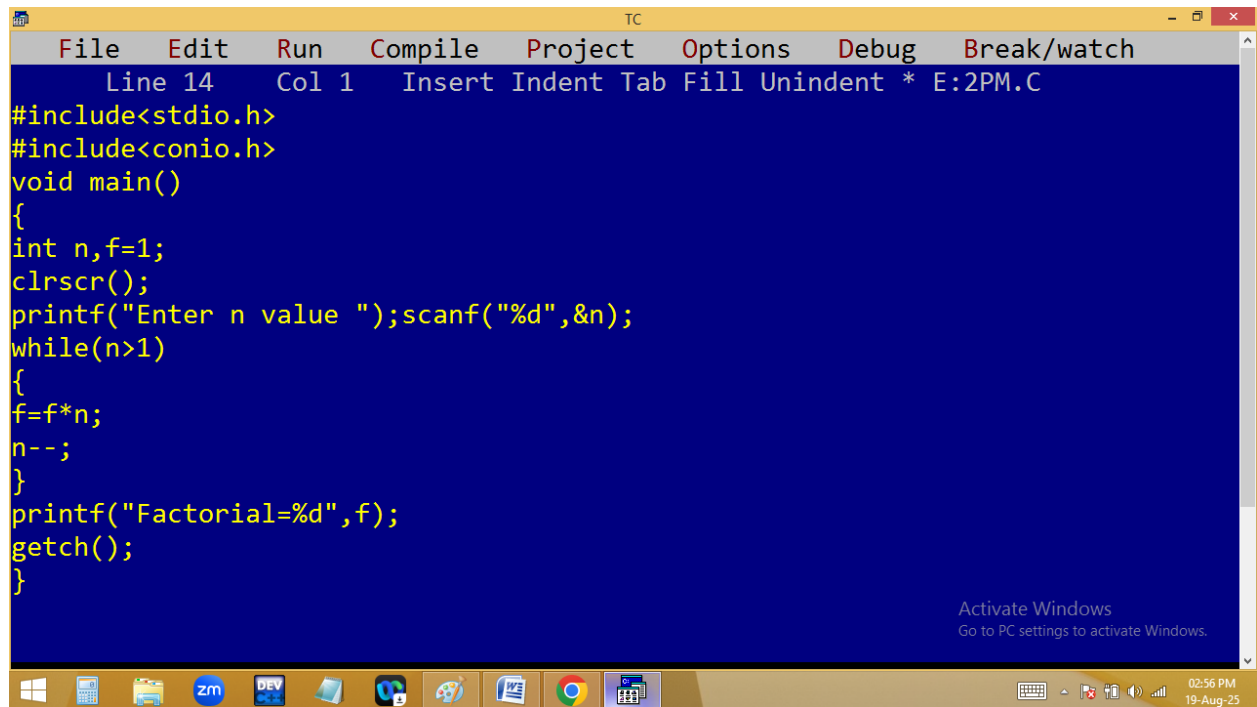
Activate Windows
Go to PC settings to activate Windows.

02:53 PM
19-Aug-25



Finding factorial of given no?

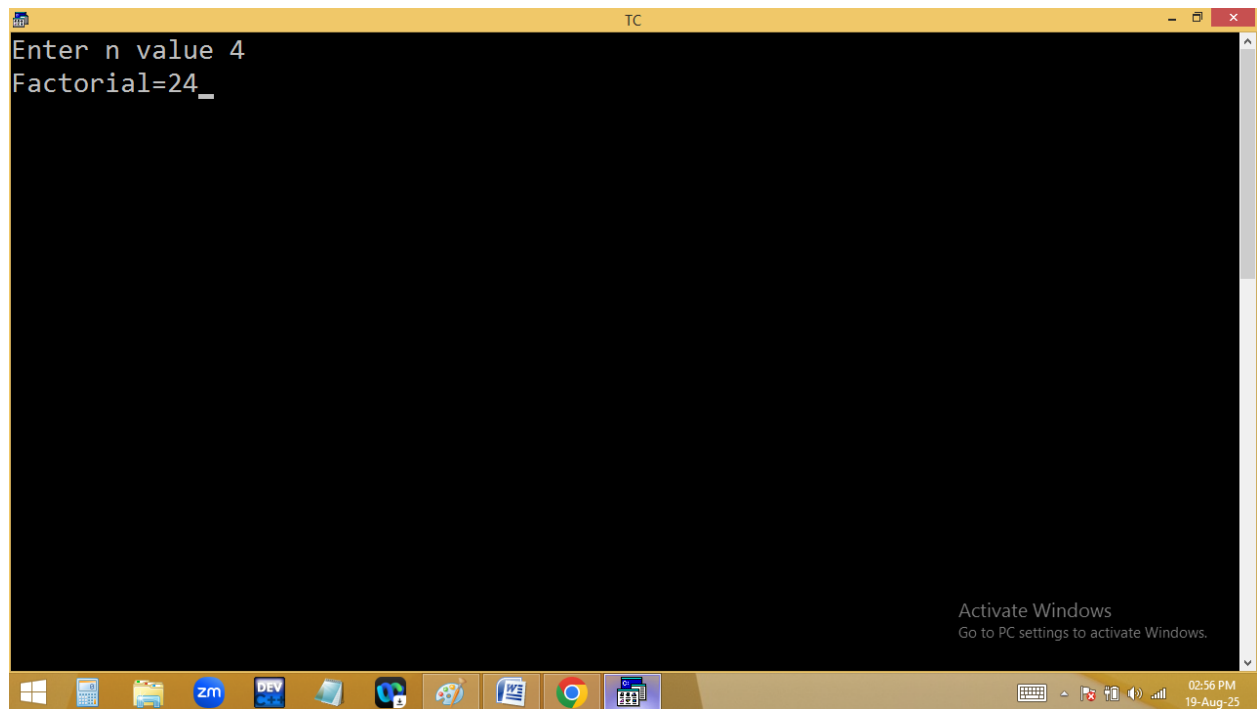
Eg: 4 → 4*3*2*1=24



The screenshot shows the Turbo C++ (TC) IDE with a yellow title bar and a menu bar containing File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 14 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C'. The main editing area has a blue background and contains the following C code:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,f=1;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>1)
{
f=f*n;
n--;
}
printf("Factorial=%d",f);
getch();
}
```

An 'Activate Windows' watermark is visible in the bottom right corner of the IDE window. The Windows taskbar at the bottom shows various application icons and the system clock indicating 02:56 PM on 19-Aug-25.



The screenshot shows the same Turbo C++ IDE window after execution. The output area, which has a black background, displays the program's output:

```
Enter n value 4
Factorial=24_
```

The 'Activate Windows' watermark is also present in the bottom right corner. The Windows taskbar at the bottom remains the same, showing the system clock at 02:56 PM on 19-Aug-25.

```
TC
Enter n value 7
Factorial=5040
```

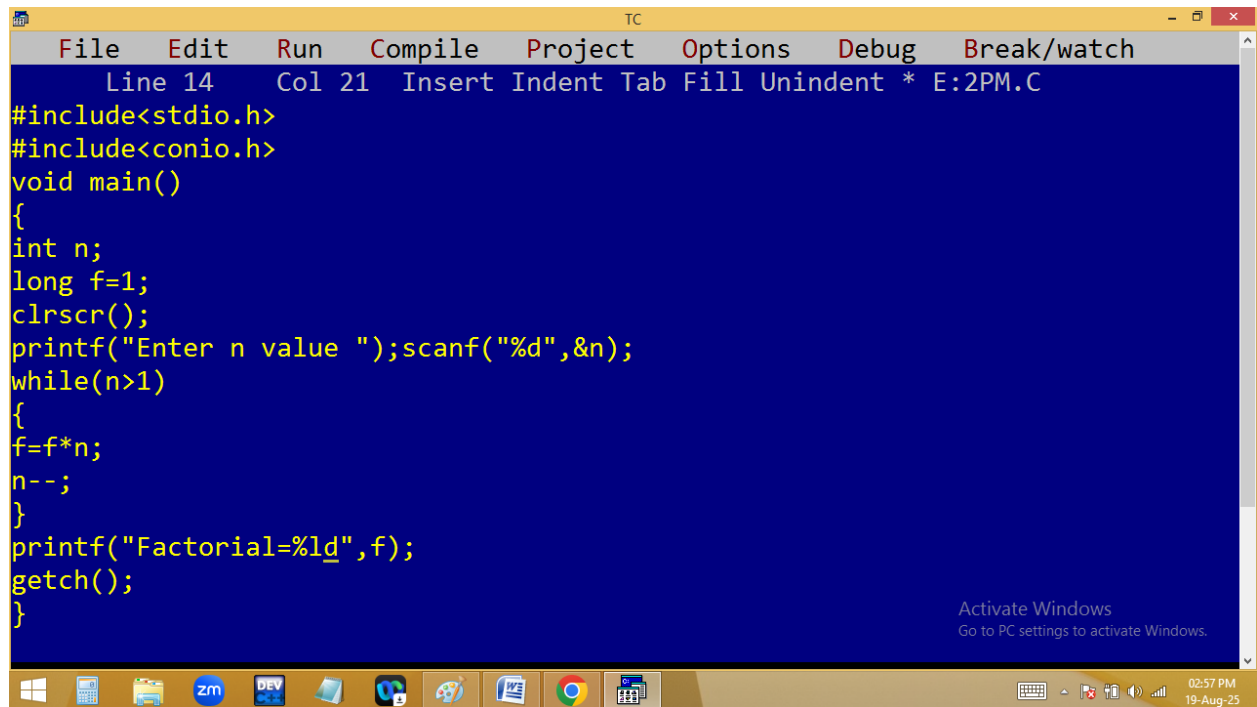
Activate Windows
Go to PC settings to activate Windows.

02:56 PM
19-Aug-25

```
TC
Enter n value 8
Factorial=-25216_
```

Activate Windows
Go to PC settings to activate Windows.

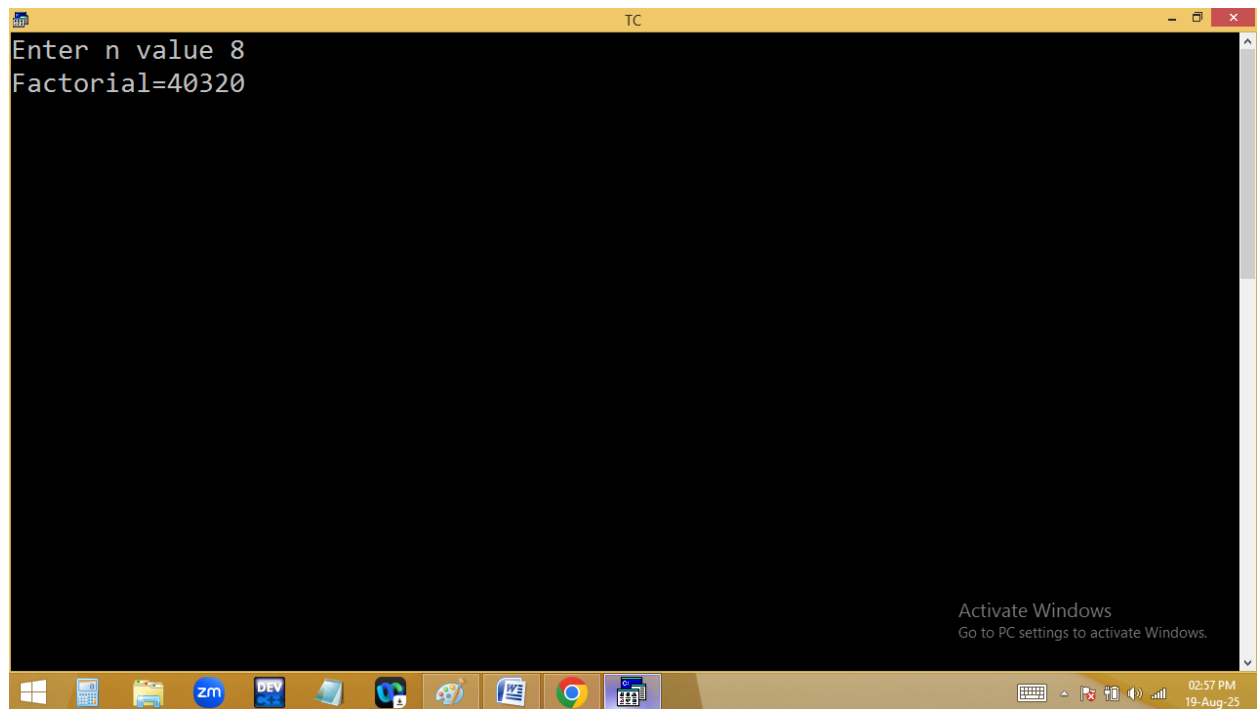
02:56 PM
19-Aug-25



The screenshot shows the Turbo C++ (TC) editor window. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 14 Col 21 Insert Indent Tab Fill Unindent * E:2PM.C'. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
long f=1;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>1)
{
f=f*n;
n--;
}
printf("Factorial=%ld",f);
getch();
}
```

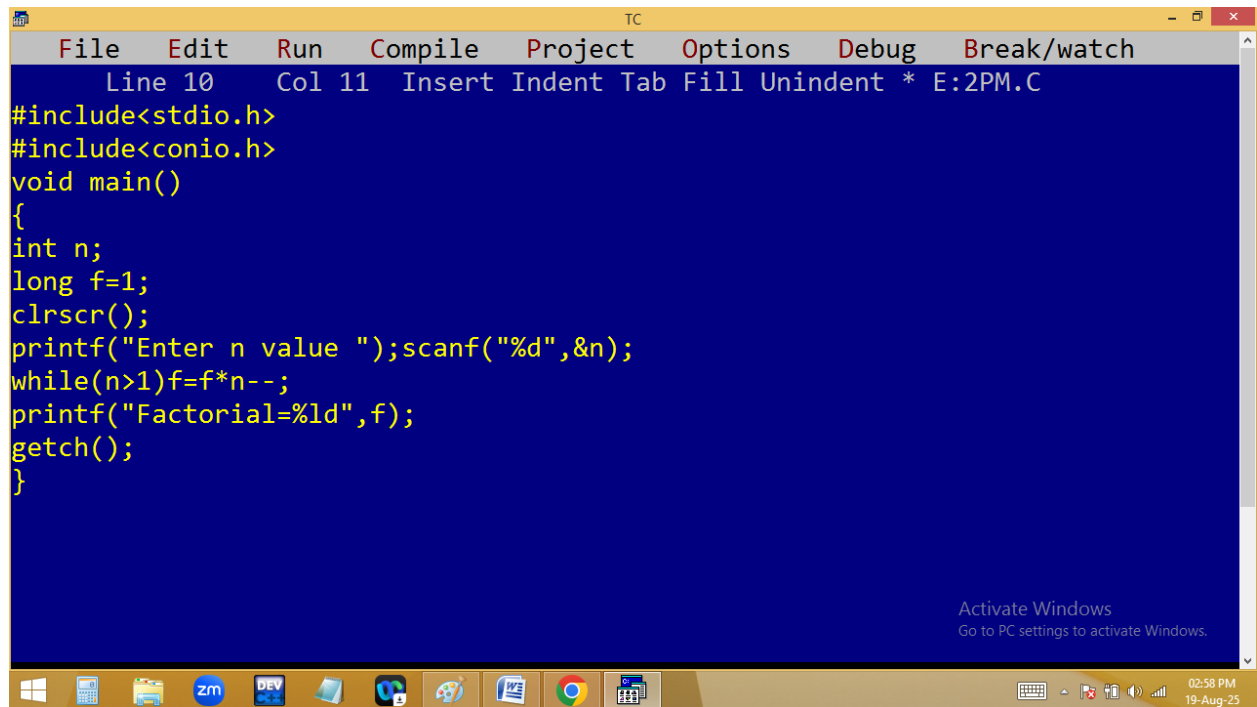
An 'Activate Windows' watermark is visible in the bottom right corner of the editor window. The Windows taskbar at the bottom shows the Start button, task view, and several application icons including a calculator, file explorer, Zoom, DEV C++, and others. The system clock in the bottom right corner shows '02:57 PM 19-Aug-25'.



This screenshot shows the same Turbo C++ editor window after execution. The code is no longer visible, and the output of the program is displayed in the editor area:

```
Enter n value 8
Factorial=40320
```

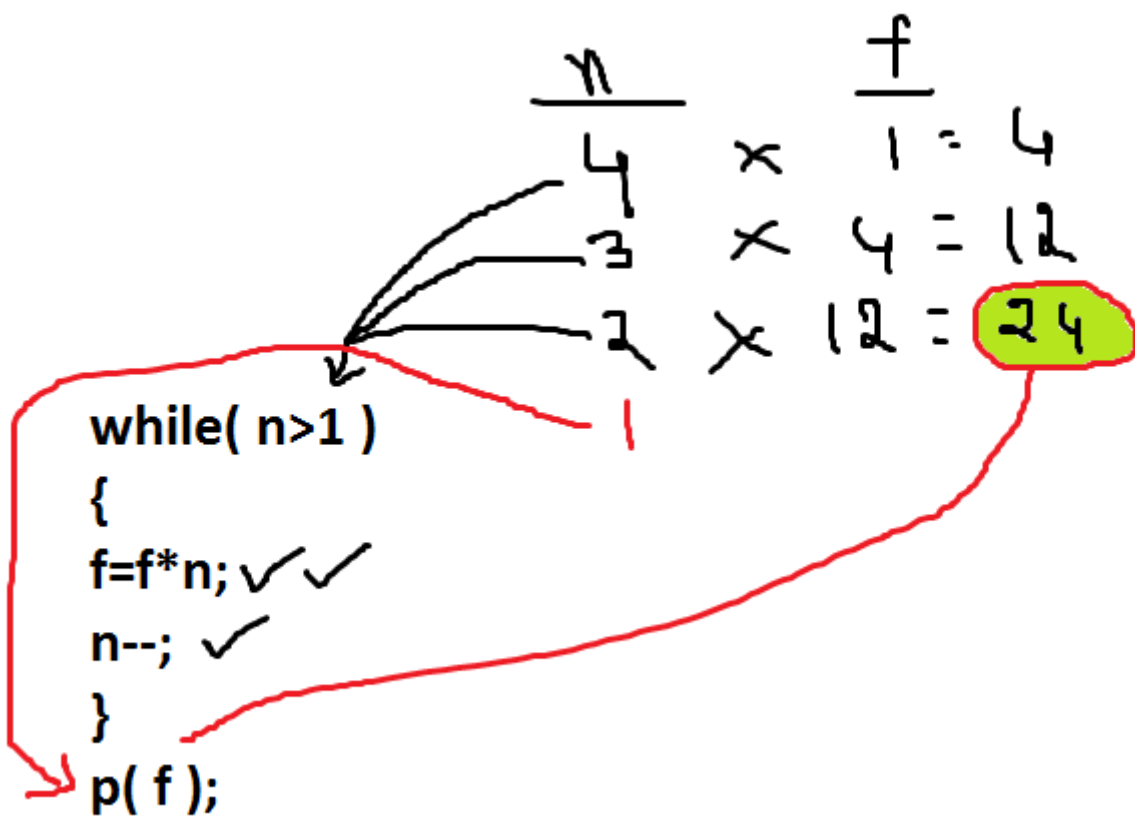
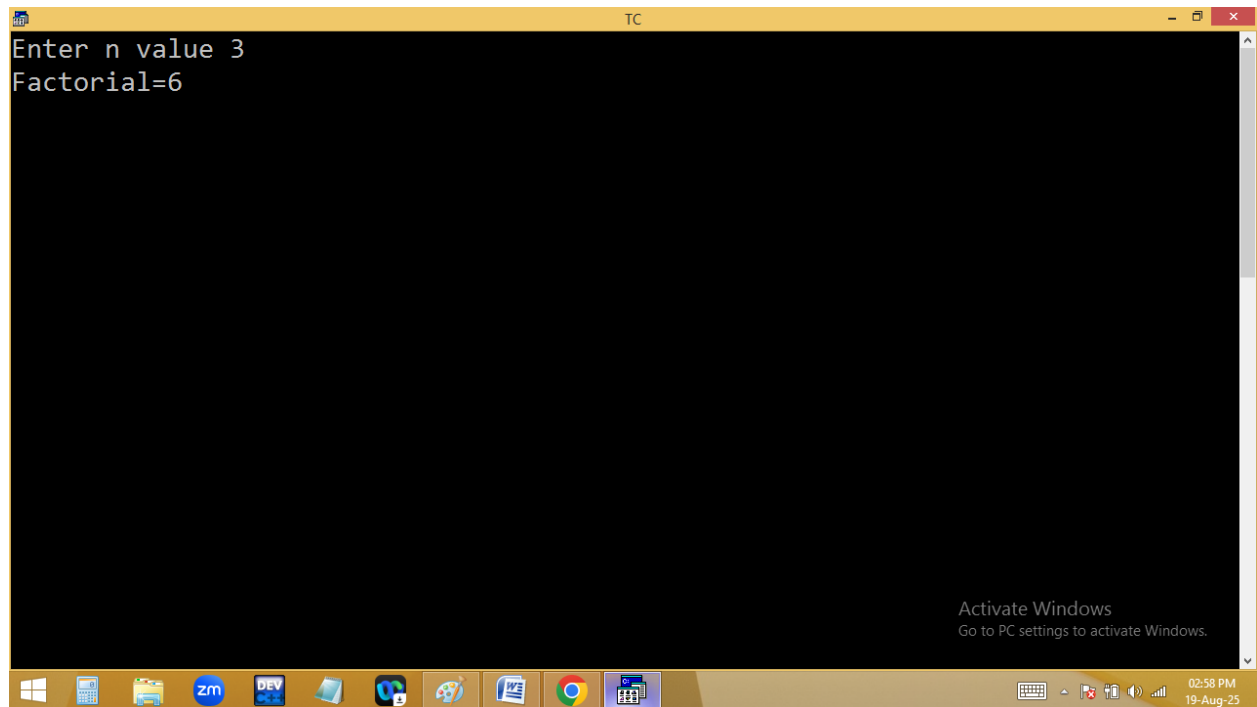
The 'Activate Windows' watermark is still present in the bottom right corner. The Windows taskbar and system clock remain the same as in the first screenshot, showing '02:57 PM 19-Aug-25'.



The image shows a screenshot of a Turbo C++ (TC) IDE window. The title bar reads "TC". The menu bar includes "File", "Edit", "Run", "Compile", "Project", "Options", "Debug", and "Break/watch". Below the menu bar, the status bar shows "Line 10 Col 11 Insert Indent Tab Fill Unindent * E:2PM.C". The main editing area has a dark blue background with yellow text. The code is as follows:

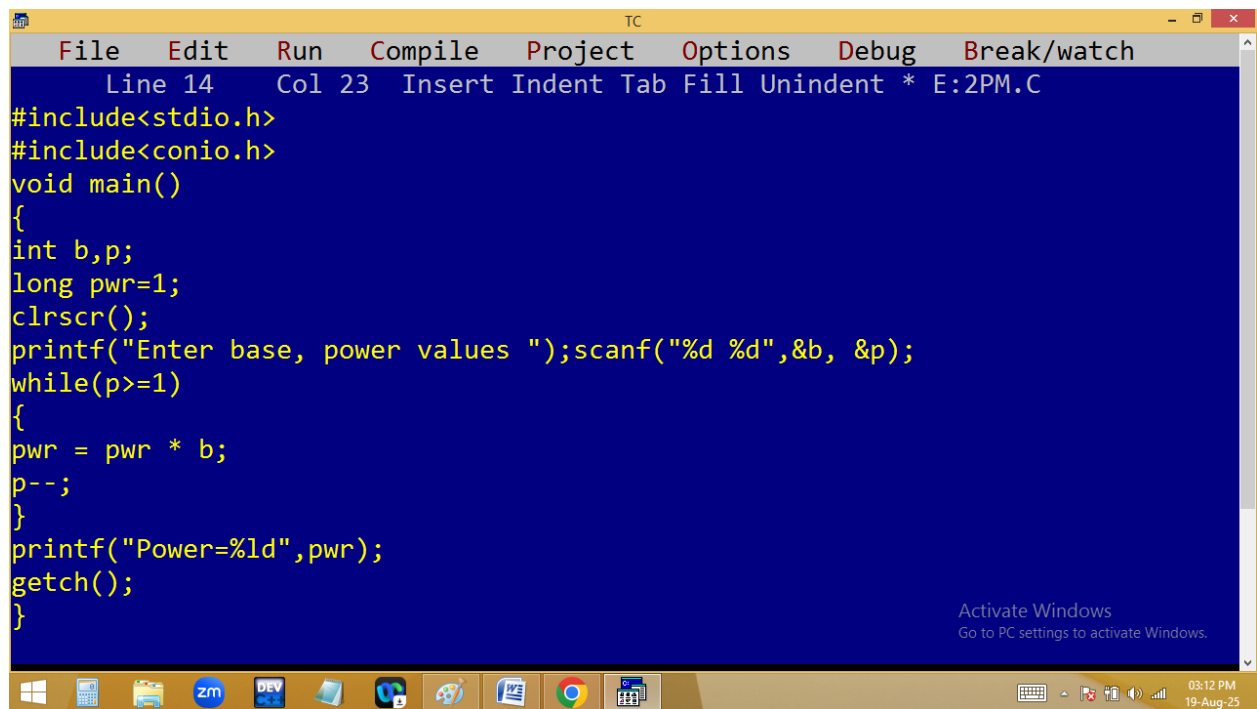
```
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
long f=1;
clrscr();
printf("Enter n value ");scanf("%d",&n);
while(n>1)f=f*n--;
printf("Factorial=%ld",f);
getch();
}
```

At the bottom right of the editing area, there is a watermark that says "Activate Windows Go to PC settings to activate Windows." The Windows taskbar is visible at the bottom, showing icons for various applications including a calculator, a file explorer, a terminal, and a web browser. The system clock in the bottom right corner shows "02:58 PM 19-Aug-25".



Find power using user defined program?

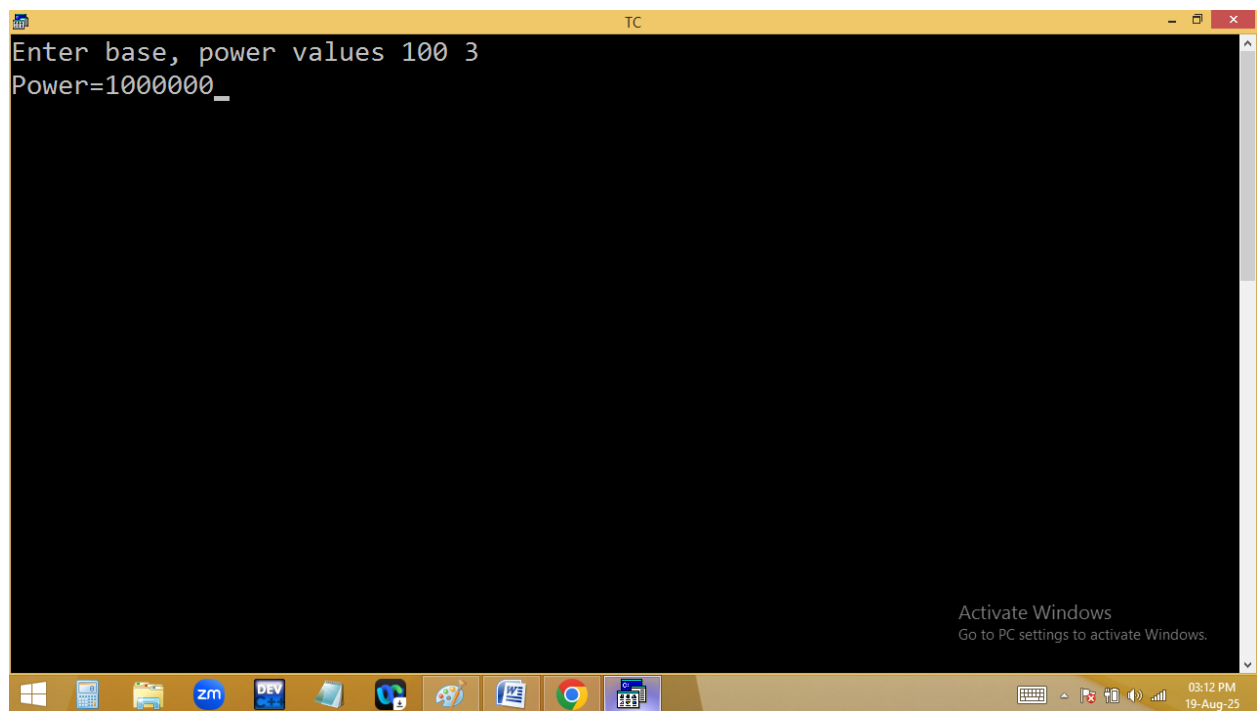
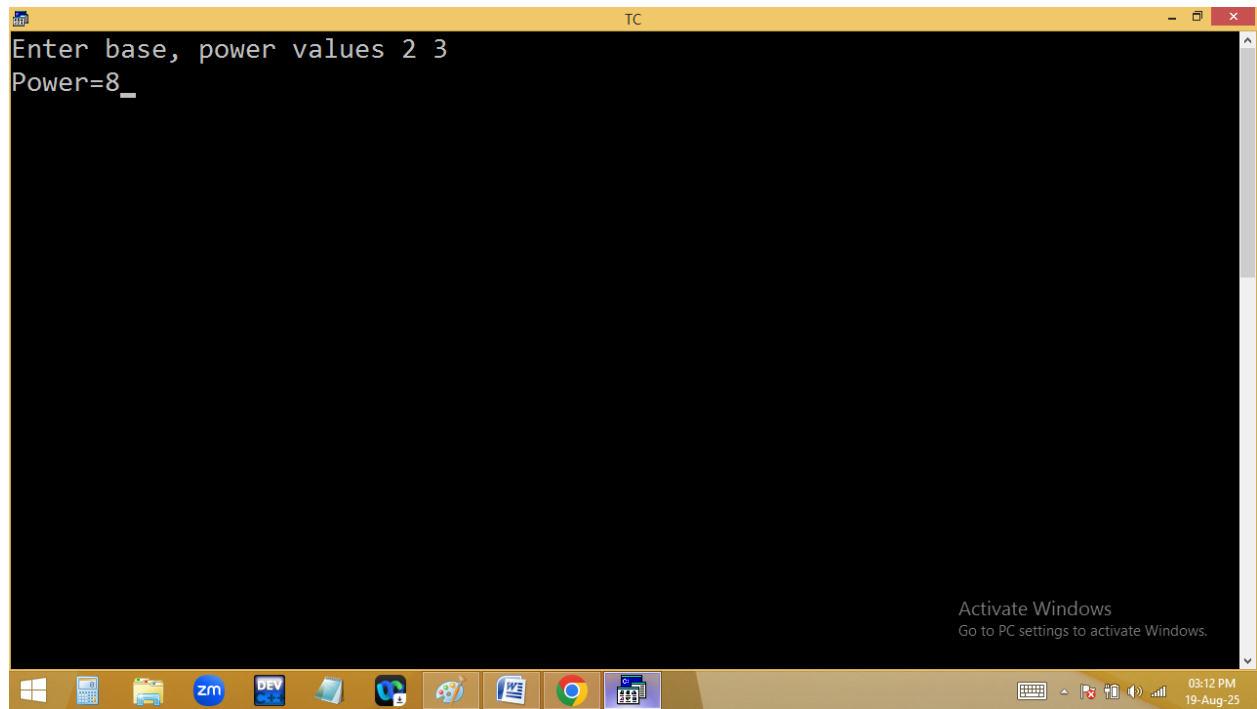
$$b / 2^4 - P = 16$$
$$2 \times 2 \times 2 \times 2 = 16$$



```
File Edit Run Compile Project Options Debug Break/watch
Line 14 Col 23 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p;
long pwr=1;
clrscr();
printf("Enter base, power values ");scanf("%d %d",&b, &p);
while(p>=1)
{
pwr = pwr * b;
p--;
}
printf("Power=%ld",pwr);
getch();
}
```

Activate Windows
Go to PC settings to activate Windows.

03:12 PM
19-Aug-25



```
TC
Enter base, power values 2 5
Power=32_
```

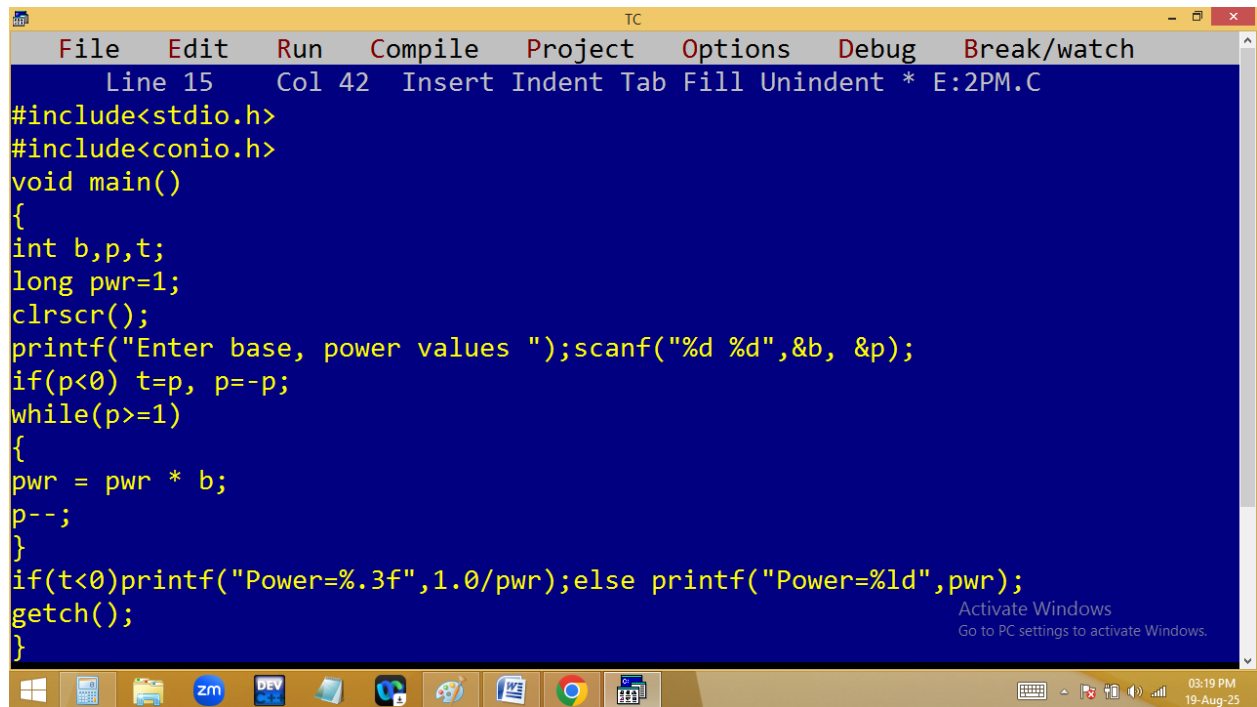
Activate Windows
Go to PC settings to activate Windows.

03:12 PM
19-Aug-25

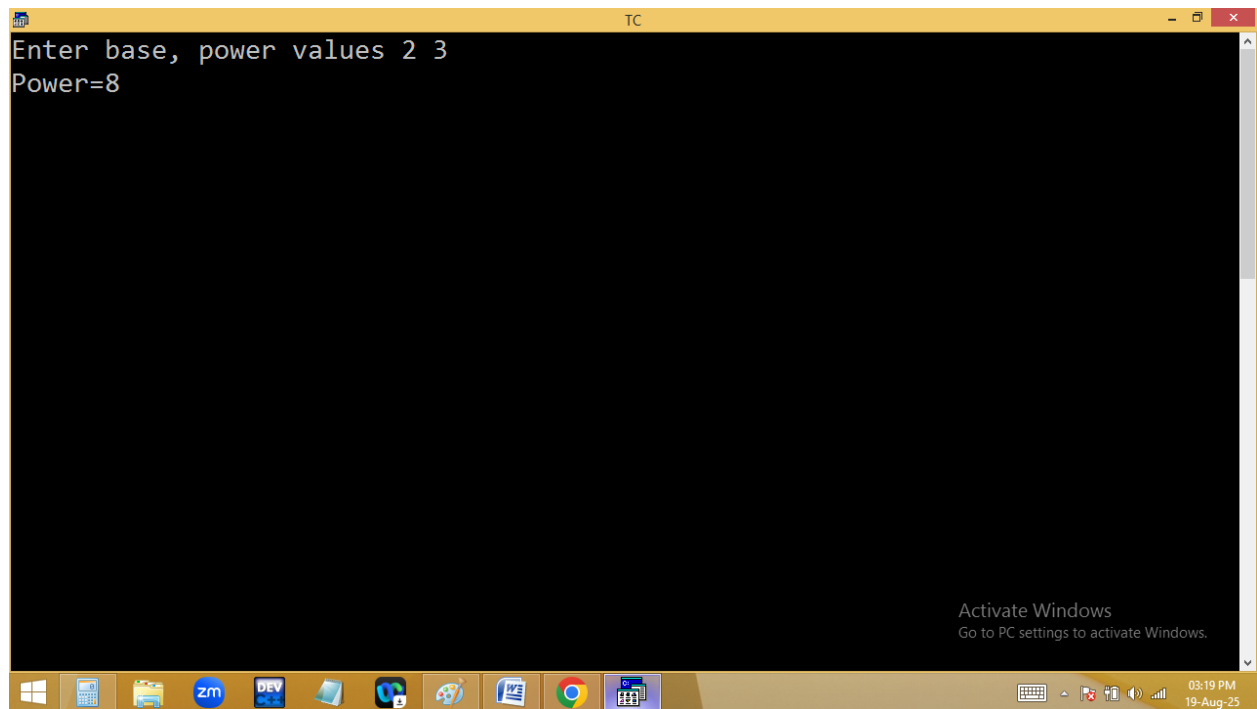
```
TC
Enter base, power values 2 -3
Power=1
```

Activate Windows
Go to PC settings to activate Windows.

03:14 PM
19-Aug-25

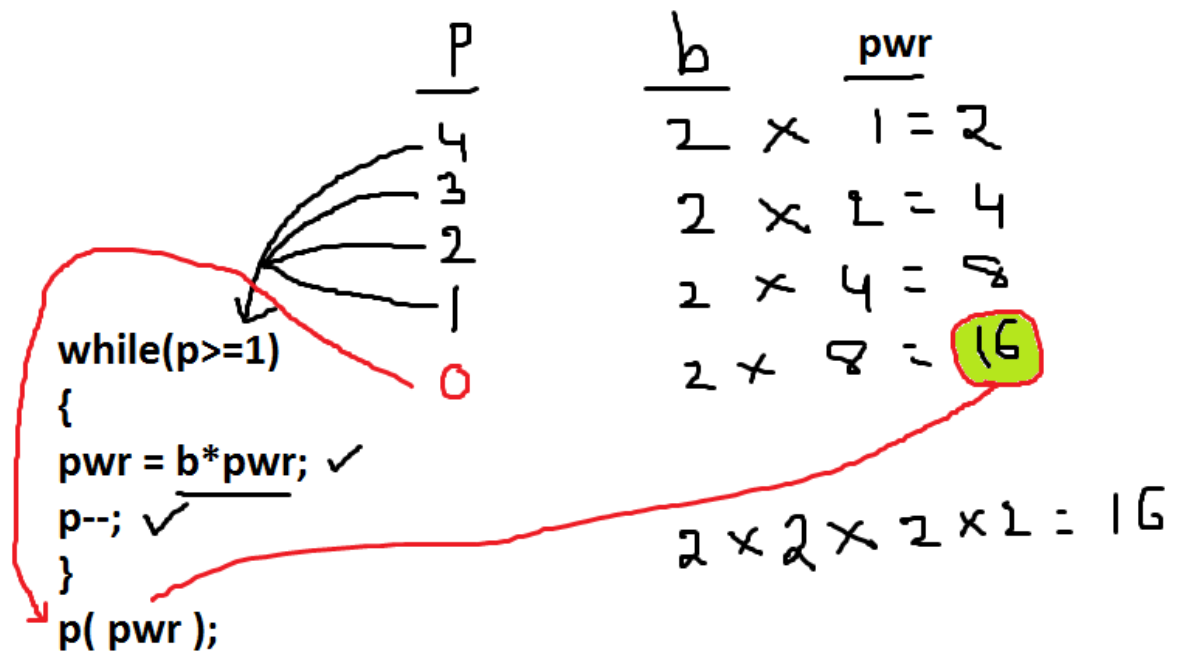
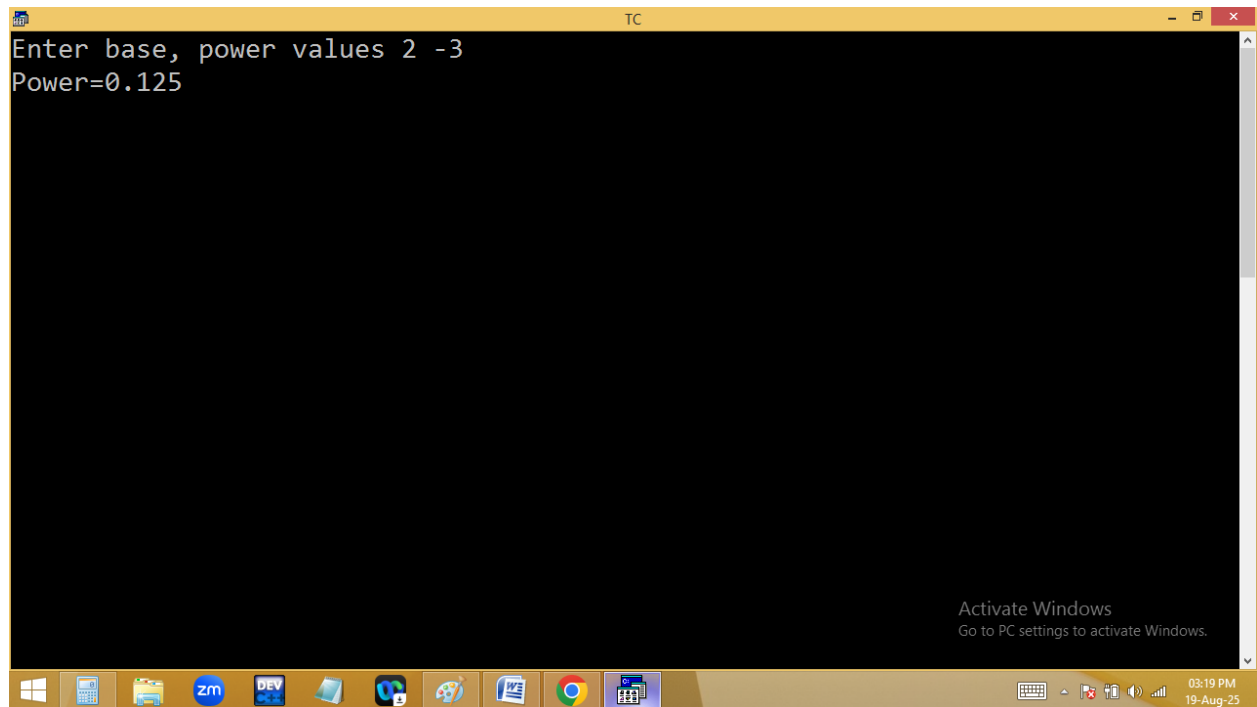


```
File Edit Run Compile Project Options Debug Break/watch
Line 15 Col 42 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p,t;
long pwr=1;
clrscr();
printf("Enter base, power values ");scanf("%d %d",&b, &p);
if(p<0) t=p, p=-p;
while(p>=1)
{
pwr = pwr * b;
p--;
}
if(t<0)printf("Power=%.3f",1.0/pwr);else printf("Power=%ld",pwr);
getch();
}
```



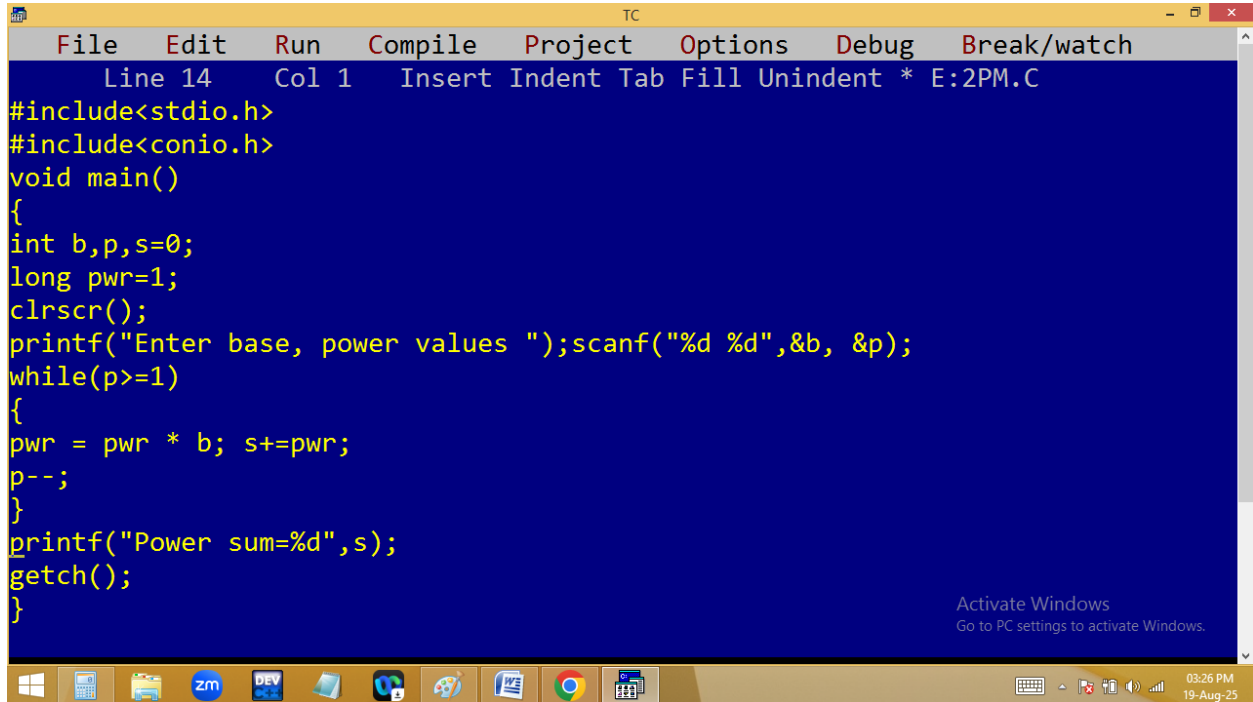
```
TC
Enter base, power values 2 3
Power=8

Activate Windows
Go to PC settings to activate Windows.
```



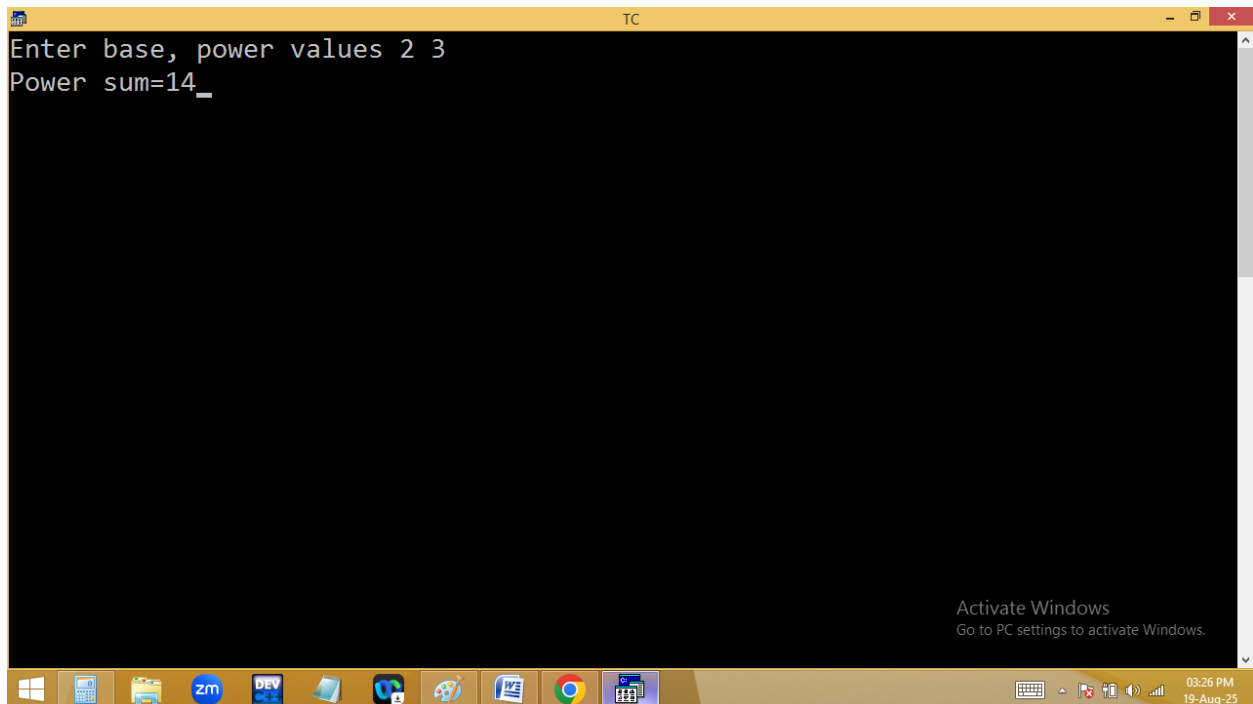
Finding powers sum?

$$2^5 \rightarrow 2^1 + 2^2 + 2^3 + 2^4 + 2^5 = 2 + 4 + 8 + 16 + 32 = 62$$



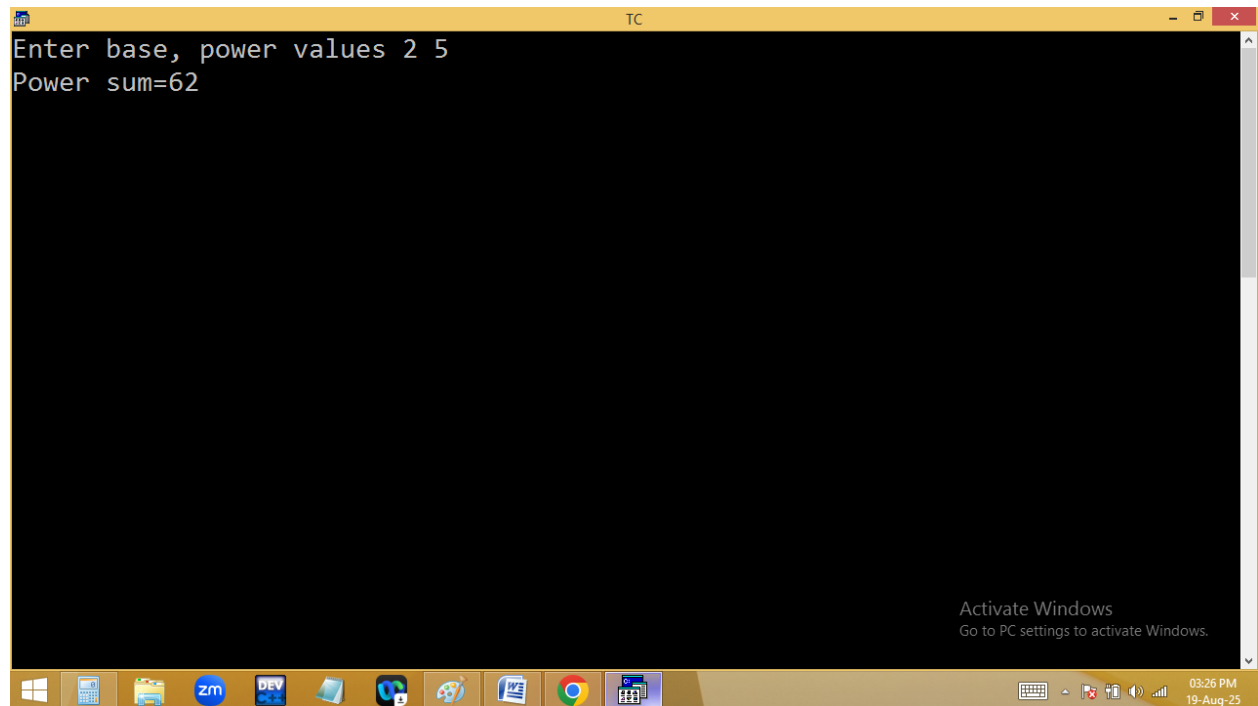
```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 14 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p,s=0;
long pwr=1;
clrscr();
printf("Enter base, power values ");scanf("%d %d",&b, &p);
while(p>=1)
{
pwr = pwr * b; s+=pwr;
p--;
}
printf("Power sum=%d",s);
getch();
}
```

Activate Windows
Go to PC settings to activate Windows.



```
TC
Enter base, power values 2 3
Power sum=14_
```

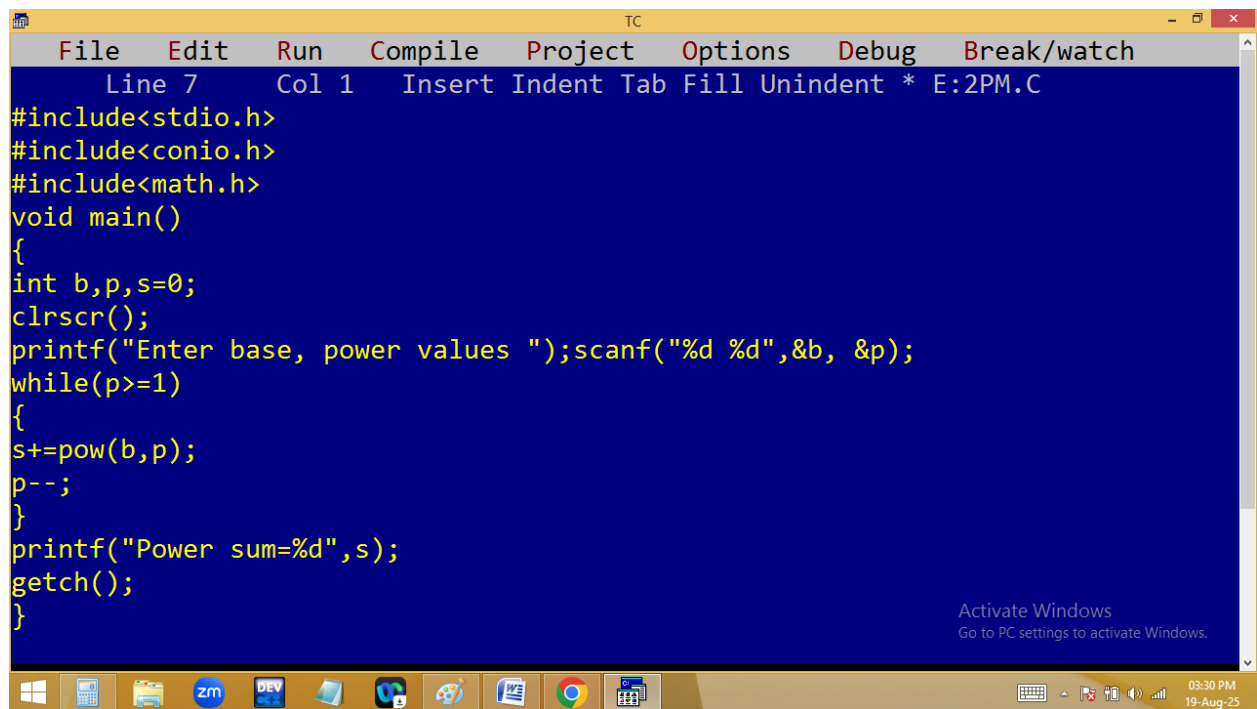
Activate Windows
Go to PC settings to activate Windows.



The screenshot shows a Windows 10 desktop environment. A terminal window titled "TC" is open, displaying the output of a C program. The program prompts the user to "Enter base, power values 2 5" and then outputs "Power sum=62". The Windows taskbar is visible at the bottom, showing various application icons including the Start button, File Explorer, Zoho Mail, Visual Studio Code, and Google Chrome. The system tray on the right indicates the time as 03:26 PM on 19-Aug-23. An "Activate Windows" watermark is present in the bottom right corner of the terminal window.

```
Enter base, power values 2 5
Power sum=62
```

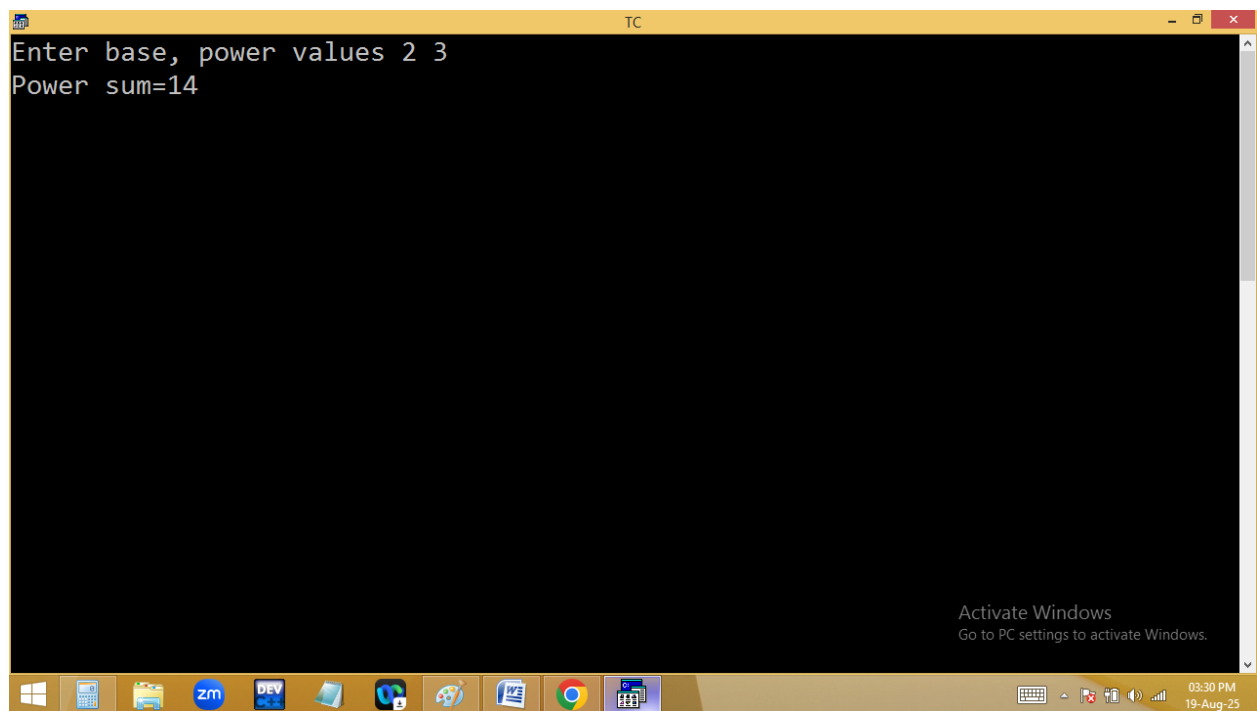
Using pow():



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 1 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
int b,p,s=0;
clrscr();
printf("Enter base, power values ");scanf("%d %d",&b, &p);
while(p>=1)
{
s+=pow(b,p);
p--;
}
printf("Power sum=%d",s);
getch();
}
```

Activate Windows
Go to PC settings to activate Windows.

03:30 PM
19-Aug-25

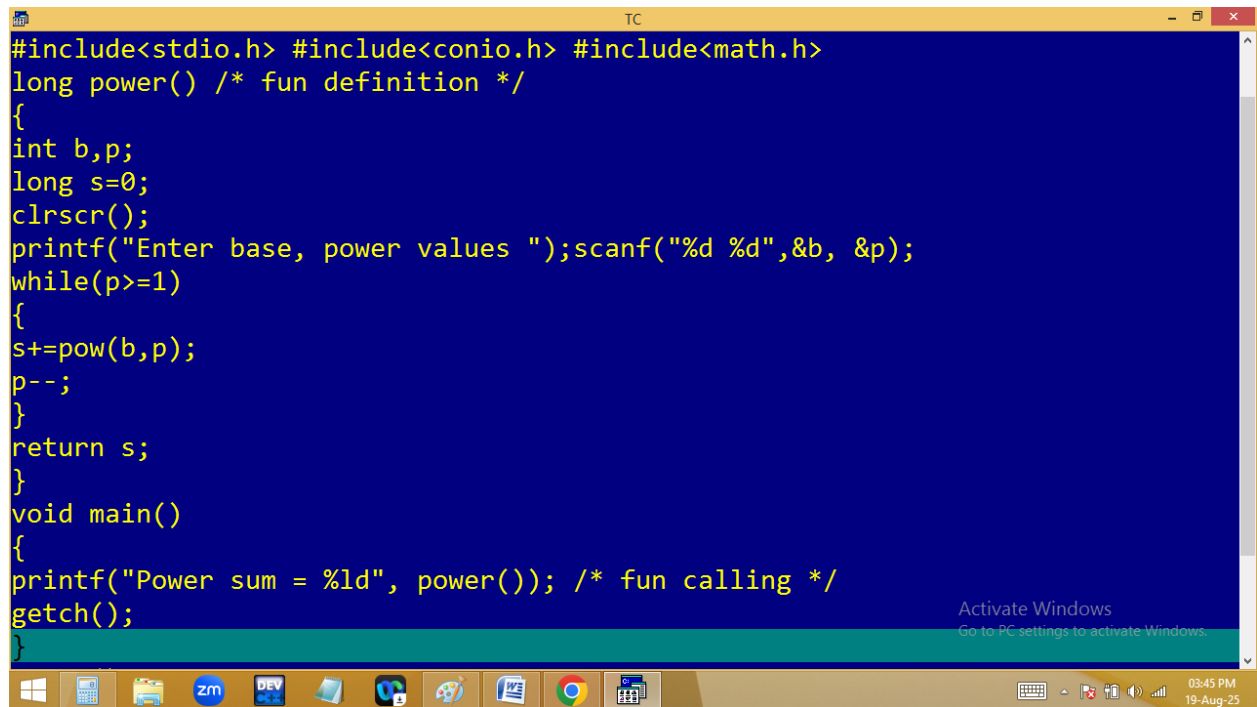


```
TC
Enter base, power values 2 3
Power sum=14
```

Activate Windows
Go to PC settings to activate Windows.

03:30 PM
19-Aug-25

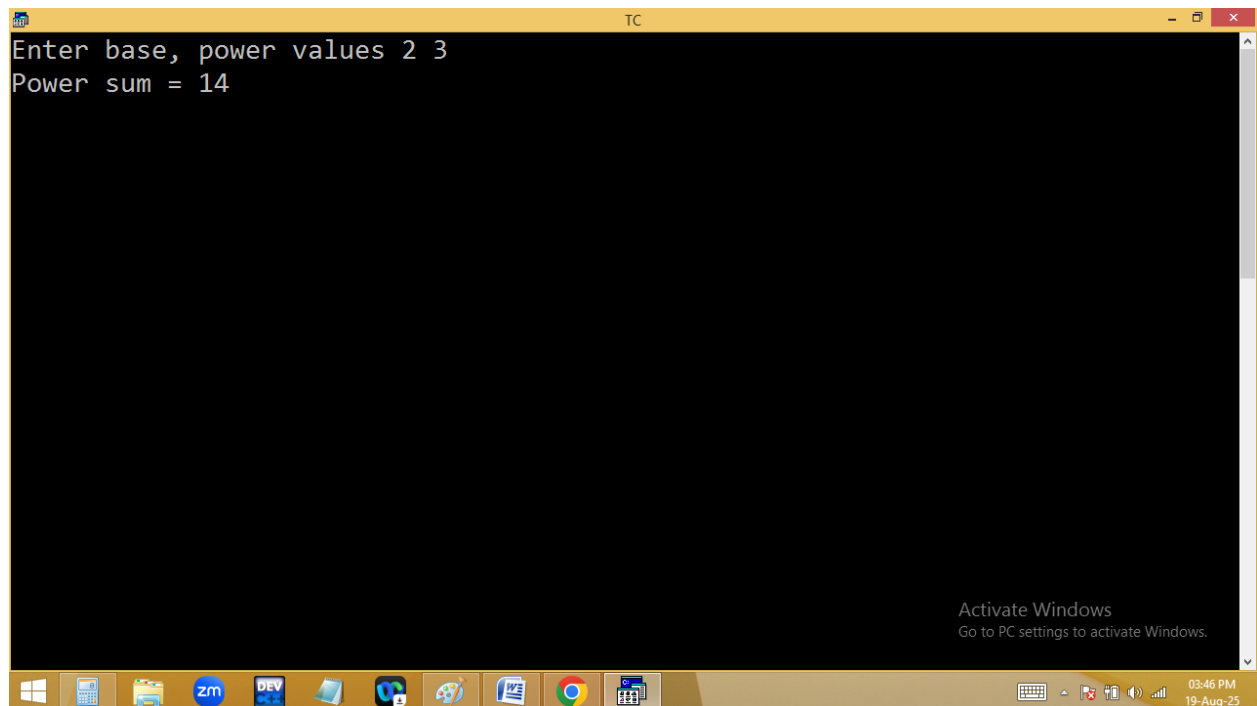
Using a user defined function?



```
#include<stdio.h> #include<conio.h> #include<math.h>
long power() /* fun definition */
{
    int b,p;
    long s=0;
    clrscr();
    printf("Enter base, power values ");scanf("%d %d",&b, &p);
    while(p>=1)
    {
        s+=pow(b,p);
        p--;
    }
    return s;
}
void main()
{
    printf("Power sum = %ld", power()); /* fun calling */
    getch();
}
```

Activate Windows
Go to PC settings to activate Windows.

03:45 PM
19-Aug-25



```
Enter base, power values 2 3
Power sum = 14
```

Activate Windows
Go to PC settings to activate Windows.

03:46 PM
19-Aug-25

s+=pow(b,p);

$$\begin{array}{rcl}
 0 + & 2^3 = & 8 \\
 8 + & 2^2 = & 12 \\
 12 + & 2^1 = & 14
 \end{array}$$

$$\frac{b}{2}$$

$$\frac{p}{3 \atop 2 \atop 1}$$

$$\begin{array}{r}
 \frac{s}{0} \\
 + 8 \\
 + 4 \\
 + 2 \\
 \hline
 14
 \end{array}$$

Home work:

Finding gcd / hcf of given two numbes.

Eg: take two numbers → 4 and 6

4 factors are 1 2 4

6 factors are 1 2 3 6

Output: 2 is hcf of 4 and 6

2. finding lcm of given two numbers.

Eg: 4 and 6 lcm is 12

$$\frac{\max}{a} \quad \frac{\max}{b}$$

$$6 \% 4 = 2$$

$$6$$

$$\frac{6}{6}$$

$$7 \% 4 = 3$$

$$8 \% 4 = 0$$

$$8 \% 6 = 2$$

$$9 \% 4 = 1$$

$$10 \% 4 = 2$$

$$11 \% 4 = 3$$

$$12 \% 4 = 0$$

$$12 \% 6 = 0$$

