

Logical operators [&&, || , !]:

&&, || used to combine two or more expressions into a single expression.

! operator for negation. i.e. true becomes false and false becomes true.

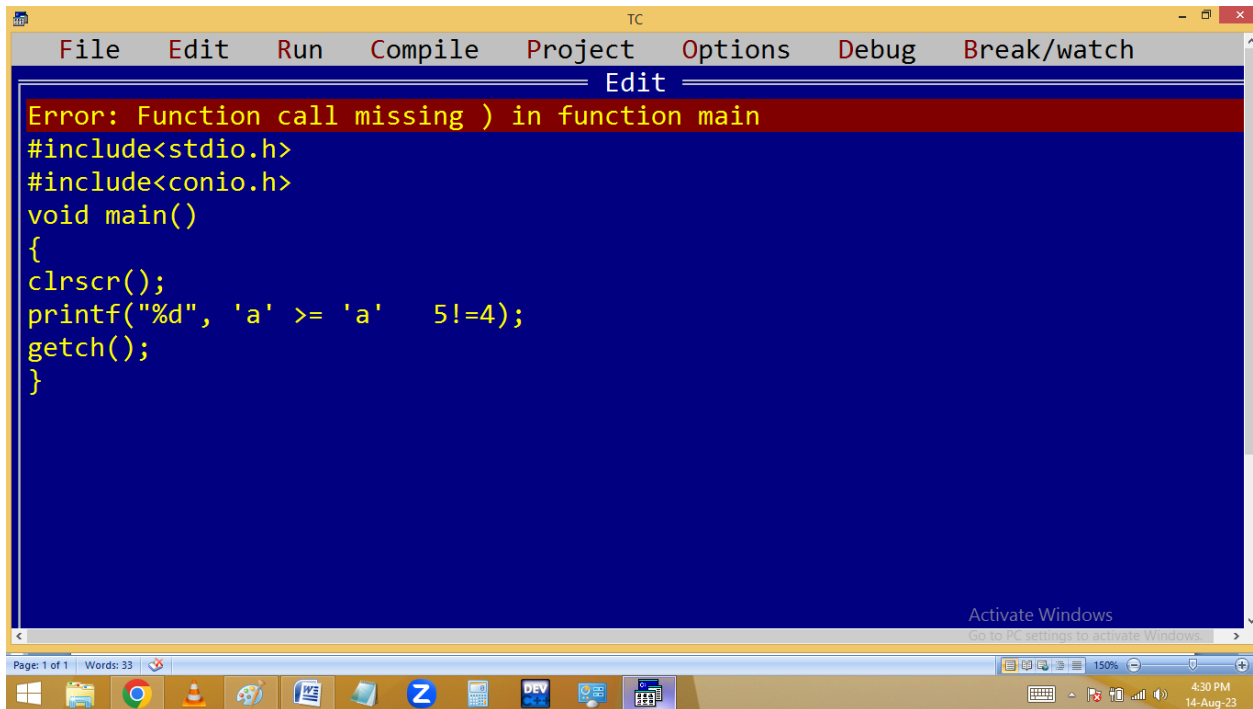
Note: In C compiler 0 means false and other than 0 anything is true i.e. 1.

Truth tables:

Operator	Expression1	Expression2	Result
&& - and	True – 1	True – 1	1
	1	0	0
	0	1	0
	0	0	0
- or	1	1	1
	1	0	1
	0	1	1
	0	0	0

!true – false

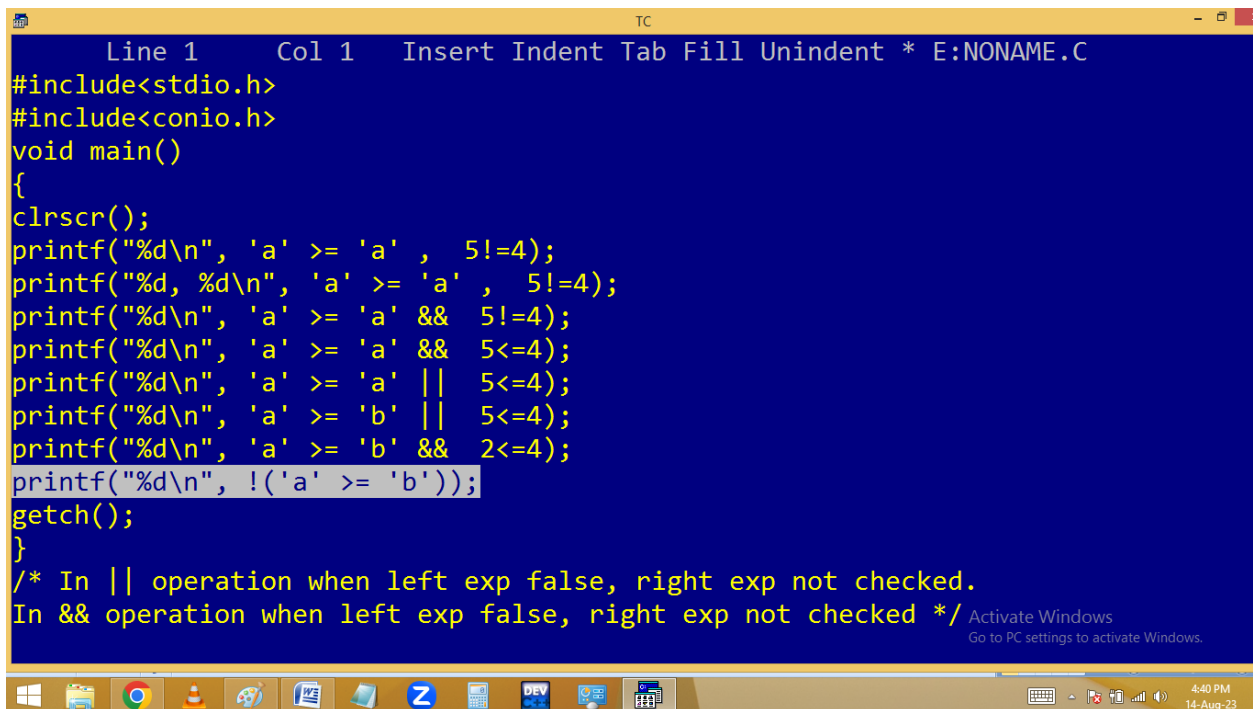
!false - true



The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main window displays a C program with a syntax error. The code is as follows:

```
Error: Function call missing ) in function main
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d", 'a' >= 'a' 5!=4);
getch();
}
```

The error message "Error: Function call missing) in function main" is displayed at the top. The status bar at the bottom indicates "Page: 1 of 1", "Words: 33", and "150%". The Windows taskbar at the bottom shows the time as 4:30 PM on 14-Aug-23.



The screenshot shows the Turbo C++ (TC) IDE with a menu bar (File, Edit, Run, Compile, Project, Options, Debug, Break/watch) and a toolbar. The main window displays a C program with multiple printf statements. The code is as follows:

```
Line 1      Col 1      Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d\n", 'a' >= 'a' , 5!=4);
printf("%d, %d\n", 'a' >= 'a' , 5!=4);
printf("%d\n", 'a' >= 'a' && 5!=4);
printf("%d\n", 'a' >= 'a' && 5<=4);
printf("%d\n", 'a' >= 'a' || 5<=4);
printf("%d\n", 'a' >= 'b' || 5<=4);
printf("%d\n", 'a' >= 'b' && 2<=4);
printf("%d\n", !('a' >= 'b'));
getch();
}
/* In || operation when left exp false, right exp not checked.
In && operation when left exp false, right exp not checked */
```

The status bar at the bottom indicates "Page: 1 of 1", "Words: 33", and "150%". The Windows taskbar at the bottom shows the time as 4:40 PM on 14-Aug-23.

```
1
1, 1
1
0
1
0
0
1
```

Page: 2 of 2 Words: 92

4:41 PM 14-Aug-23

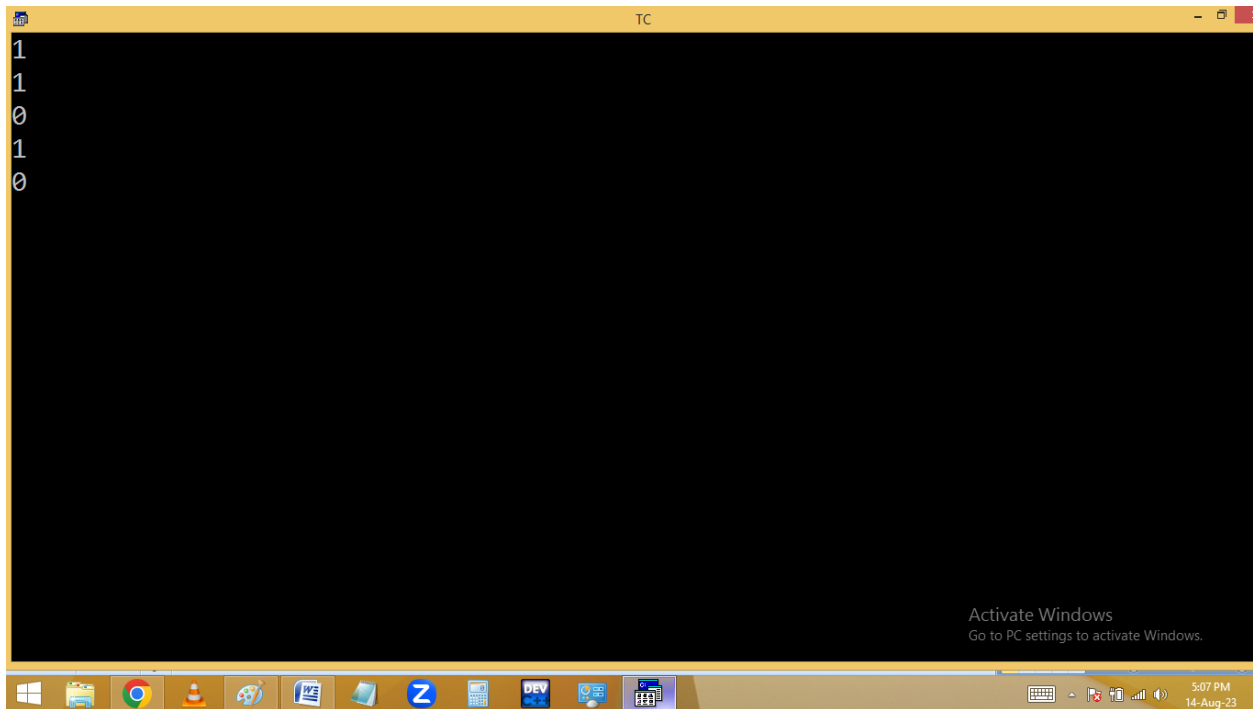
```
File Edit Run Compile Project Options Debug Break/watch
Line 12 Col 45 Insert Indent Tab Fill Unindent * E:\NONAME.C
#include<conio.h>
void main()
{
clrscr();
printf("%d\n", printf("Kishore") && printf("Naidu"));
printf("%d\n", printf("") && printf("Naidu"));
printf("%d\n", printf("Kishore") || printf("Naidu"));
printf("%d\n", 7== printf("Kishore") && printf("Naidu"));
printf("%d\n", printf("Kishore") == printf(" Indian") && printf("Naidu"));
printf("%d\n", printf("Kishore") == printf(" Indian") || printf("Naidu"));
printf("%d\n", printf("Kishore") == printf("Indian") || printf("Naidu"));
getch();
}
```

Line 12 Col 45 Insert Indent Tab Fill Unindent * E:\NONAME.C

4:58 PM 14-Aug-23

```
KishoreNaidu1
0
Kishore1
KishoreNaidu1
Kishore IndianNaidu1
Kishore Indian1
KishoreIndianNaidu1
```

```
File Edit Run Compile Project Options Debug Break/watch
Line 10 Col 27 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<conio.h>
void main()
{
clrscr();
printf("%d\n", 5 && 5.5);
printf("%d\n", 'a' && 'b');
printf("%d\n", '0' && 0);
printf("%d\n", 0 || '0');
printf("%d\n", 0 || !'0');
getch();
}
```



$$\begin{array}{c} \underline{5 >= 3} \ \&\& \ \underline{7 <= 10} \\ \underline{1 \ \&\& \ 1} \\ 1 \end{array}$$

$$\begin{array}{c} \underline{3 != 3} \ \&\& \ \underline{4 <= 4} \\ \underline{0} \end{array} \quad \text{Not checked}$$

$$\begin{array}{c} \underline{'a' != 'b'} \ || \ \underline{8 <= 7} \\ \underline{1} \end{array} \quad \text{Not checked}$$

$$\begin{array}{c} \underline{0} \ || \ \underline{!0} \\ \underline{0} \ || \ \underline{48} \\ \underline{0} \ || \ \underline{0} \\ 0 \end{array}$$

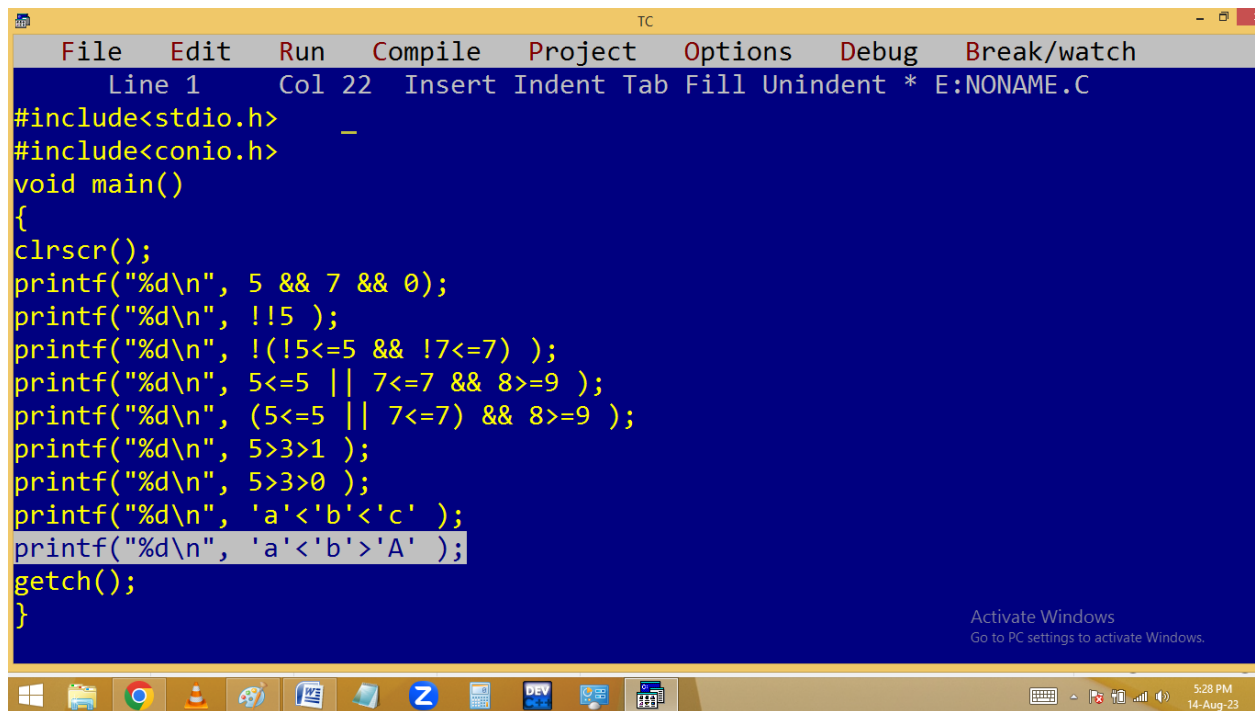
$$\begin{array}{c} \text{! (} \underline{5 >= 6} \text{)} \\ \underline{0} \\ \underline{!0} \\ 1 \end{array}$$

$$\begin{array}{c} \underline{5 \ \&\& \ 5.5} \\ \underline{1 \ \&\& \ 1} \\ 1 \end{array}$$

$$\begin{array}{c} \underline{'a' \ \&\& \ 'b'} \\ \underline{97} \quad \underline{98} \\ \underline{1 \ \&\& \ 1} \\ 1 \end{array}$$

$$\begin{array}{c} \underline{'0' \ \&\& \ 0} \\ \underline{48} \quad \underline{0} \\ \underline{1 \ \&\& \ 0} \\ 0 \end{array}$$

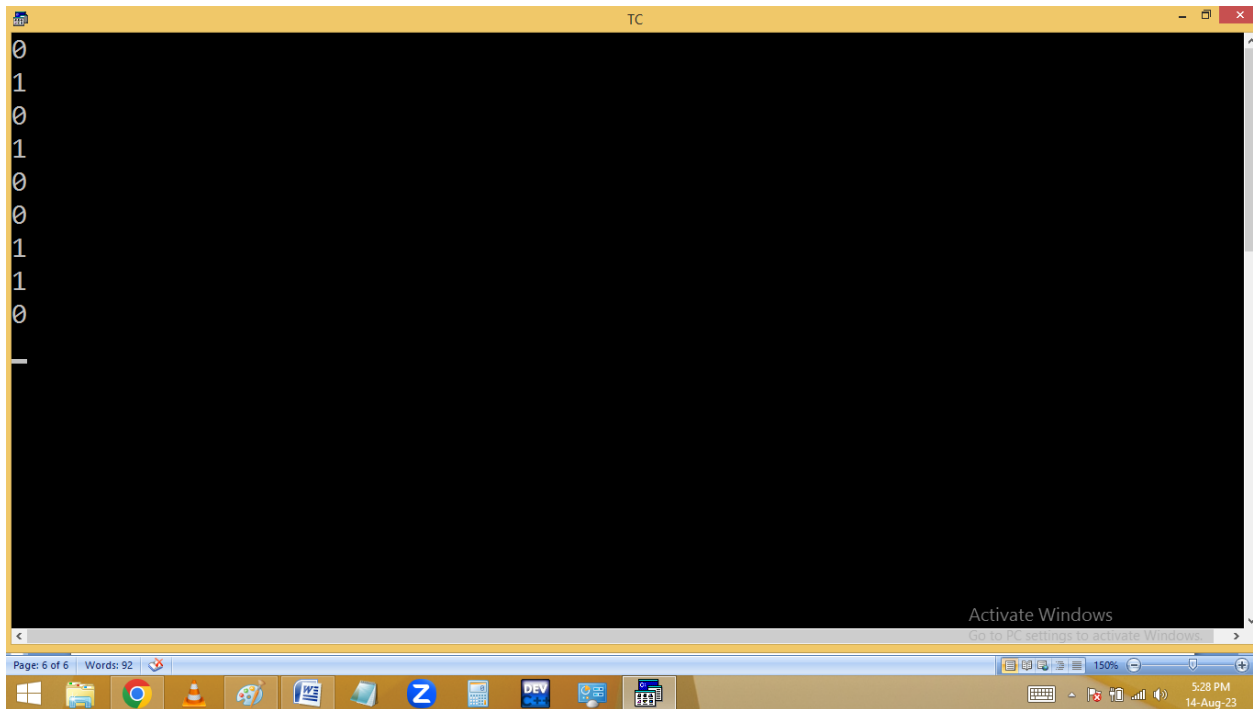
$$\begin{array}{c} \underline{0} \ || \ \underline{'0'} \\ \underline{0} \ || \ \underline{48} \\ \underline{0} \ || \ \underline{1} \\ 1 \end{array}$$



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 1 Col 22 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
printf("%d\n", 5 && 7 && 0);
printf("%d\n", !!5 );
printf("%d\n", !(5<=5 && 7<=7) );
printf("%d\n", 5<=5 || 7<=7 && 8>=9 );
printf("%d\n", (5<=5 || 7<=7) && 8>=9 );
printf("%d\n", 5>3>1 );
printf("%d\n", 5>3>0 );
printf("%d\n", 'a'<'b'<'c' );
printf("%d\n", 'a'<'b'>'A' );
getch();
}
```

Activate Windows
Go to PC settings to activate Windows.

5:28 PM
14-Aug-23



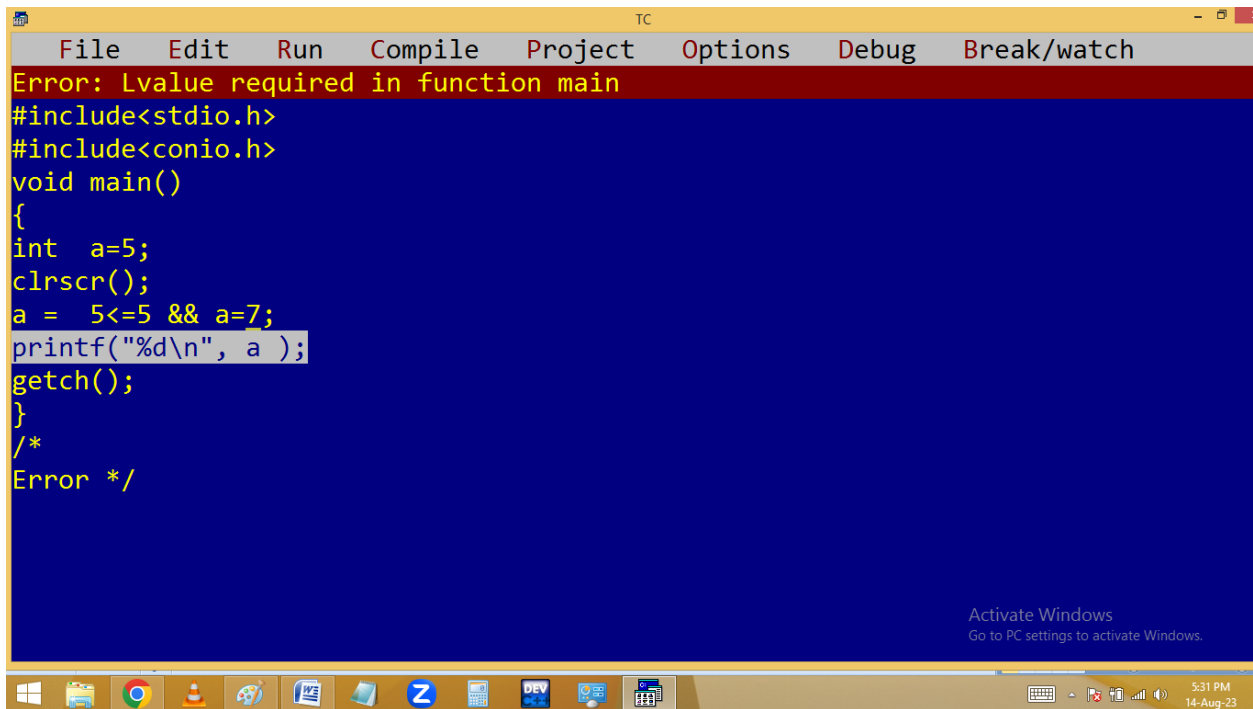
$$\begin{array}{r}
 \underline{5 \ \&\& \ 7 \ \&\& \ 0} \\
 \underline{1 \ \&\& \ 1} \quad \underline{\quad} \\
 \underline{1 \quad \&\& \quad 0} \\
 \hline
 5 <= 5 \ || \ 7 <= 7 \ \&\& \ 8 >= 9 \\
 \underline{1 \quad \&\& \quad 0} \\
 \hline
 1 \ || \ 0 \\
 \hline
 1
 \end{array}$$

$$\begin{array}{r}
 \underline{!!5} \\
 \underline{!1} \\
 \underline{0} \\
 \underline{!0} \\
 1
 \end{array}$$

$$\begin{array}{r}
 \underline{!(!5 <= 5 \ \&\& \ !7 <= 7)} \\
 \begin{array}{cc}
 \underline{1} & \underline{1} \\
 \underline{0} & \underline{0} \\
 \underline{0 <= 5} & \underline{0 <= 7} \\
 \underline{1 \quad \&\& \quad 1} \\
 \underline{01} \\
 0
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \underline{(5 <= 5 \ || \ 7 <= 7) \ \&\& \ 8 >= 9} \\
 \underline{1 \ || \ 1} \quad \underline{\quad} \\
 \underline{1 \quad \&\& \quad 0} \\
 \hline
 5 > 3 > 1 \\
 \underline{1} > \underline{1} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \underline{'a' < 'b' > 'A'} \\
 \underline{97 < 98} \\
 \underline{1} > \underline{65} \\
 0
 \end{array}$$



The image shows a screenshot of a Turbo C++ (TC) IDE window. The title bar at the top reads "TC". Below it is a menu bar with the following options: File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. A red error message banner at the top of the code editor area states: "Error: Lvalue required in function main". The code editor has a dark blue background with yellow text. The code is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int  a=5;
clrscr();
a = 5<=5 && a=7;
printf("%d\n", a );
getch();
}
/*
Error */
```

The line `a = 5<=5 && a=7;` is highlighted with a light blue selection. In the bottom right corner of the IDE window, there is a message: "Activate Windows Go to PC settings to activate Windows." The Windows taskbar is visible at the bottom of the screen, showing various application icons and the system clock indicating 5:31 PM on 14-Aug-23.

a=5

a = 5 <= 5 && a = 7;

a = | && a = 7

| && 5

a = 1 & 7
↑

const copy not allowed

Increment && decrement /modify operators [++ / --]:

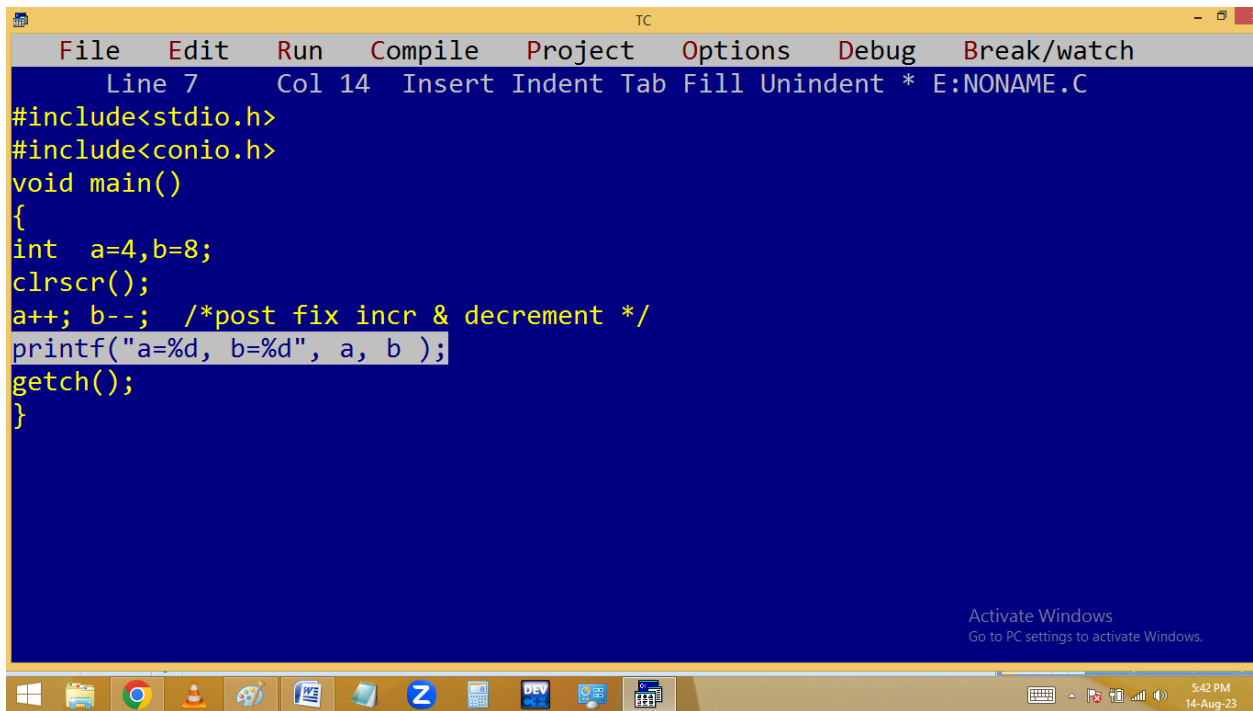
They are used to increment or decrement a variable value by 1.

Eg:

Int a=4, b=8;

a++; i.e. a=a+1 → a=5

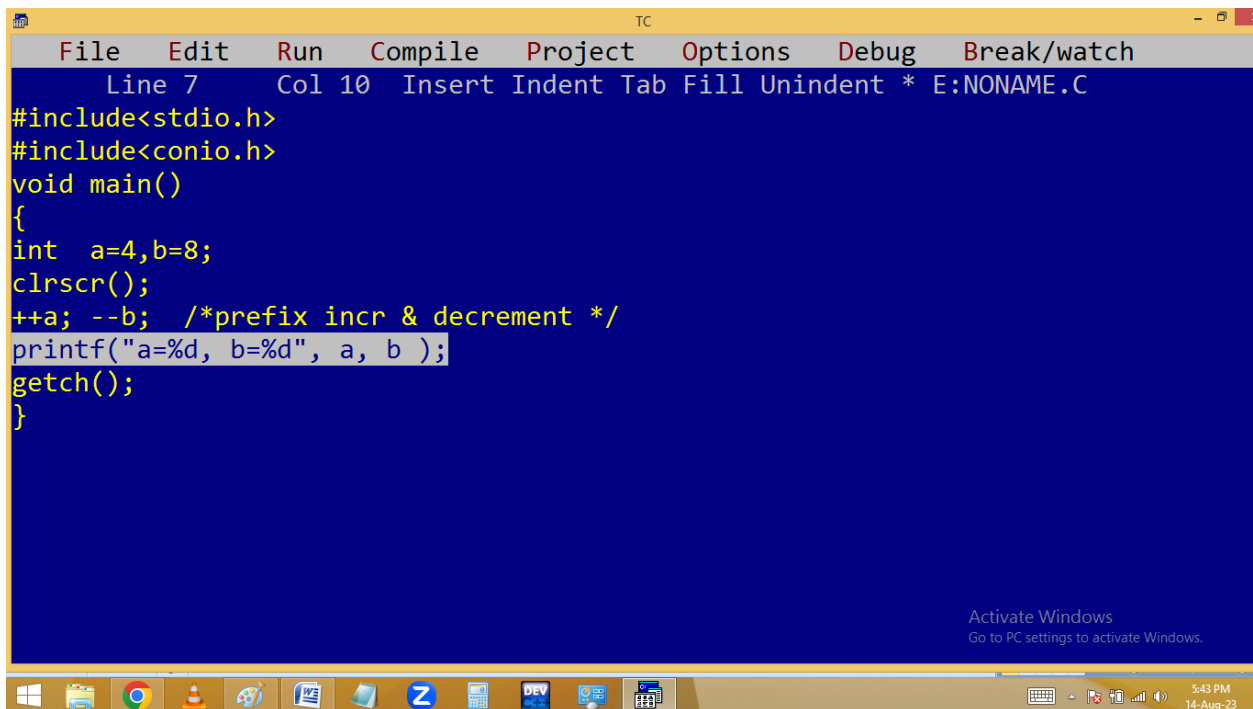
b--; i.e. b=b-1 → b=7



The screenshot shows the Turbo C++ IDE with a C program. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 7 Col 14' and 'Insert Indent Tab Fill Unindent * E:NONAME.C'. The code is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a=4,b=8;
    clrscr();
    a++; b--; /*post fix incr & decrement */
    printf("a=%d, b=%d", a, b );
    getch();
}
```

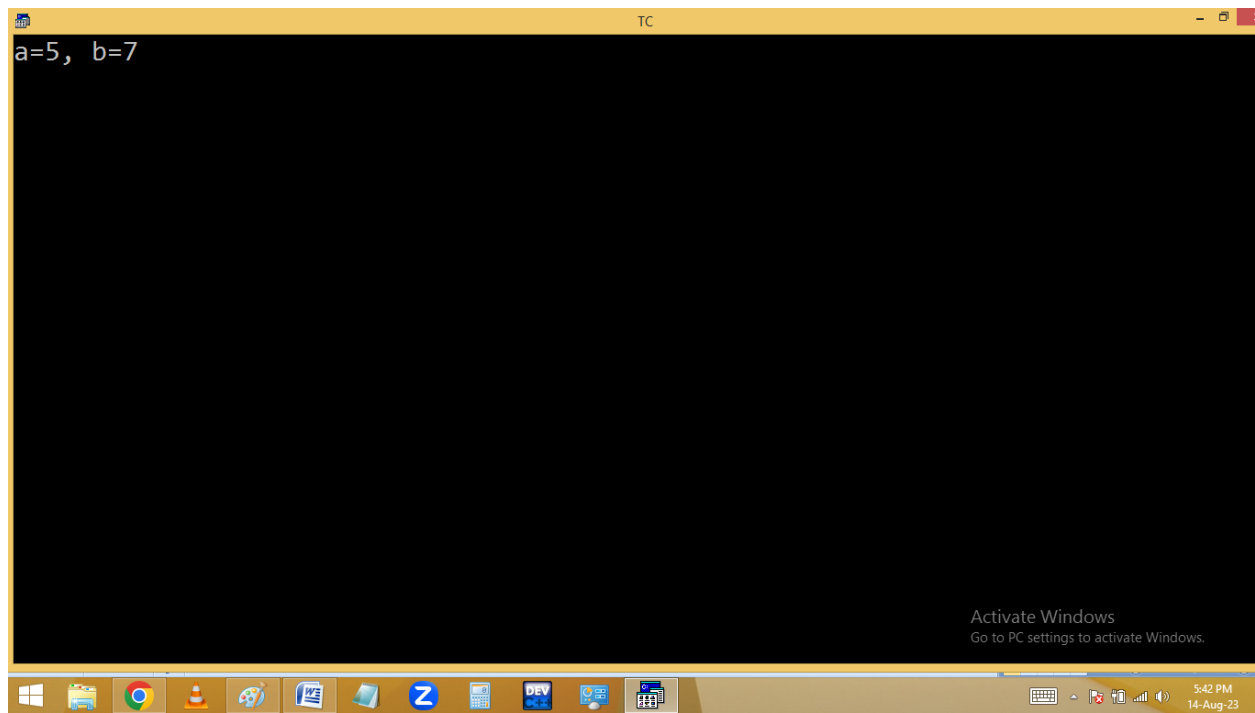
The taskbar at the bottom shows various application icons and the system clock indicating 5:42 PM on 14-Aug-23. An 'Activate Windows' watermark is visible in the bottom right corner.



The screenshot shows the Turbo C++ IDE with a C program. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the top indicates 'Line 7 Col 10' and 'Insert Indent Tab Fill Unindent * E:NONAME.C'. The code is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a=4,b=8;
    clrscr();
    ++a; --b; /*prefix incr & decrement */
    printf("a=%d, b=%d", a, b );
    getch();
}
```

The taskbar at the bottom shows various application icons and the system clock indicating 5:43 PM on 14-Aug-23. An 'Activate Windows' watermark is visible in the bottom right corner.



Note: Until assigning to any other variable, pre and post operations are same.

```
File Edit Run Compile Project Options Debug Break/watch
Line 15 Col 12 Insert Indent Tab Fill Unindent * E:NONAME.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a=2,b;
clrscr();
b=++a;
printf("a=%d, b=%d\n", a, b );
a=2;
b=a++;
printf("a=%d, b=%d\n", a, b );
getch();
}
/* a=3, b=3
a=3, b=2_*/
```

a=2

b=++a;

priority: ++a, b=a

1. ++a ==> a=3

2. b=a ==> b=3

a=2

b=a++;

priority: b=a, a++

1. b=a==> b=2

2. a++ ==> a=3