

Finding factorial of given no:

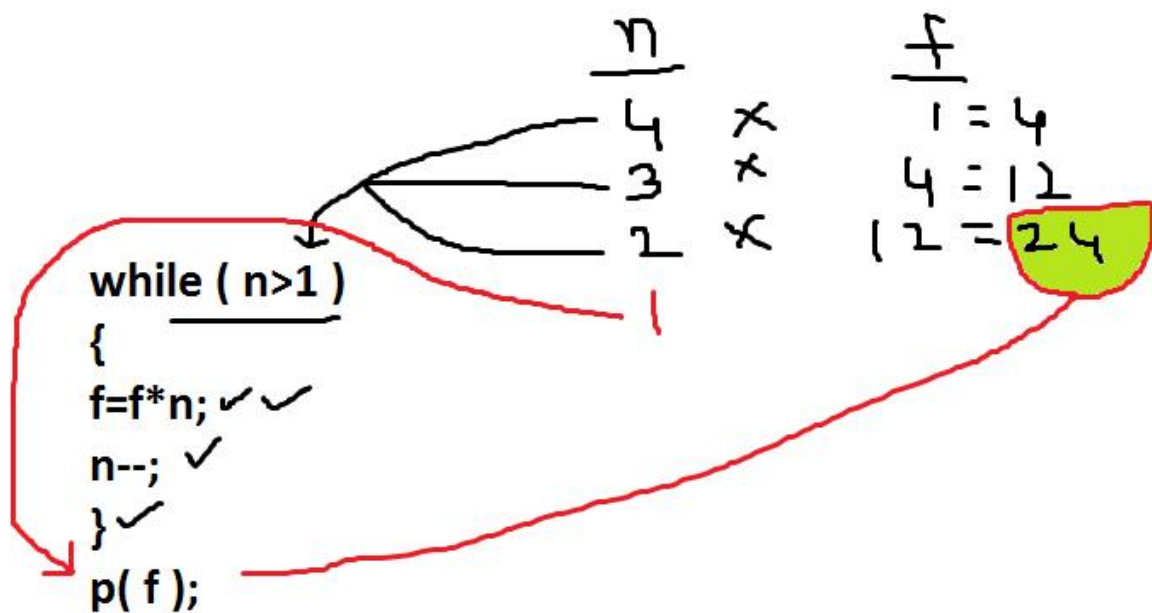
The image shows two screenshots of the Turbo C++ (TC) IDE. The top screenshot displays the source code for a program that calculates the factorial of a number. The code is as follows:

```
File Edit Run Compile Project Options Debug Break/watch
Line 13 Col 21 Insert Indent Tab Fill Unindent * E:9AM.C
#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();
}
```

The bottom screenshot shows the program's execution. It prompts the user to enter a value for 'n', which is 8. The program then outputs the factorial of 8, which is 40320.

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

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



Finding power value using user defined program:

$$2^5 = 32$$

The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays the source code for a C program named 'E:9AM.C'. The code uses `#include<stdio.h>` and `#include<conio.h>`. The `main` function declares variables `b`, `p`, and `r` (where `r` is initialized to 1). It prompts the user to enter base and power values using `scanf`, then enters a `while` loop that multiplies `r` by `b` and decrements `p` until `p` is less than 1. Finally, it prints the result of `r` and waits for a key press using `getch`.

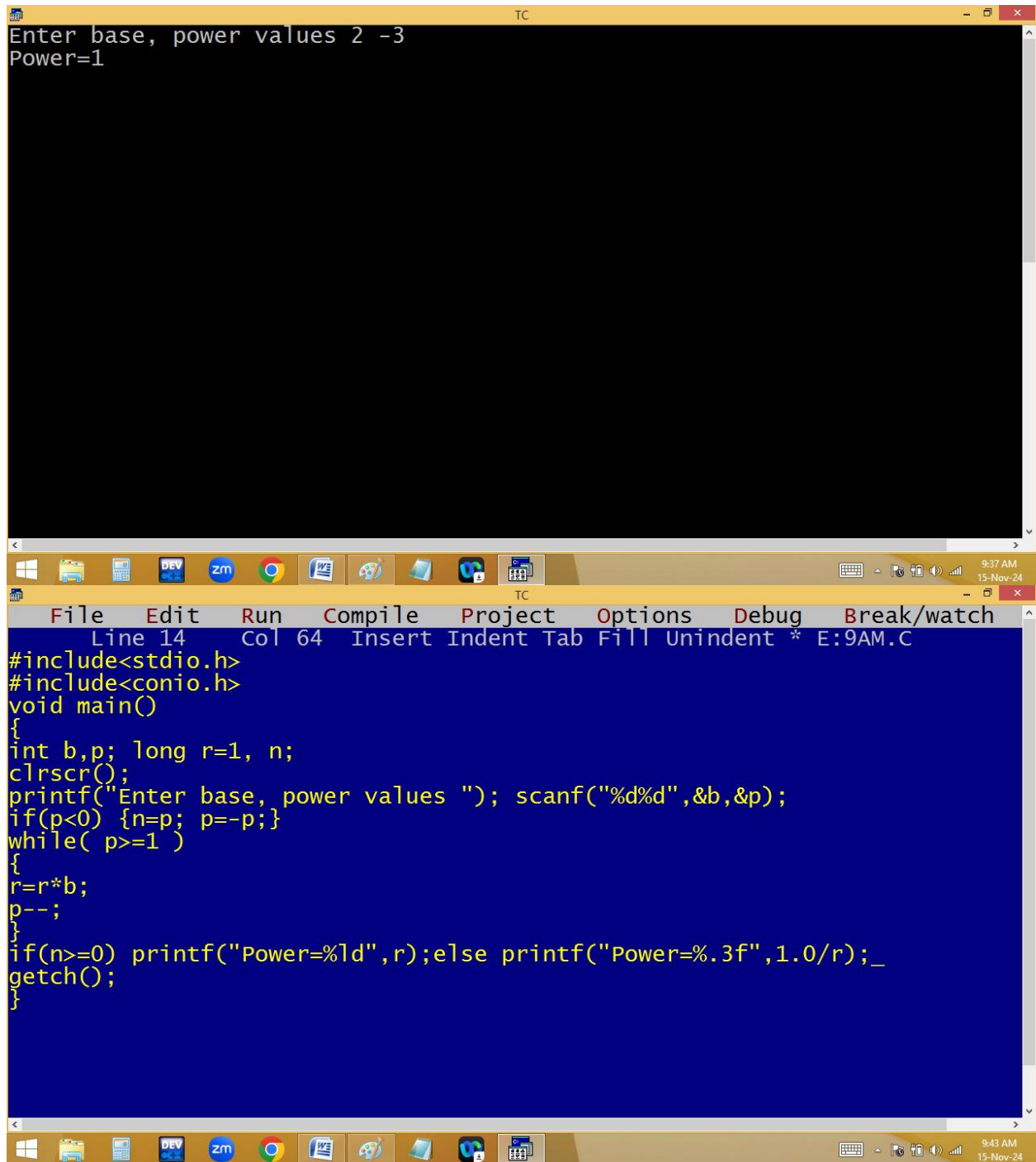
```
File Edit Run Compile Project Options Debug Break/watch
Line 13 Col 21 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p; long r=1;
clrscr();
printf("Enter base, power values "); scanf("%d%d",&b,&p);
while( p>=1 )
{
r=r*b;
p--;
}
printf("Power=%ld",r);
getch();
}
```

The bottom window shows the program's execution. It displays the prompt "Enter base, power values" followed by the user input "2 5". The output shows "Power=32".

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

```
TC
Enter base, power values 100 3
Power=1000000_
```

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



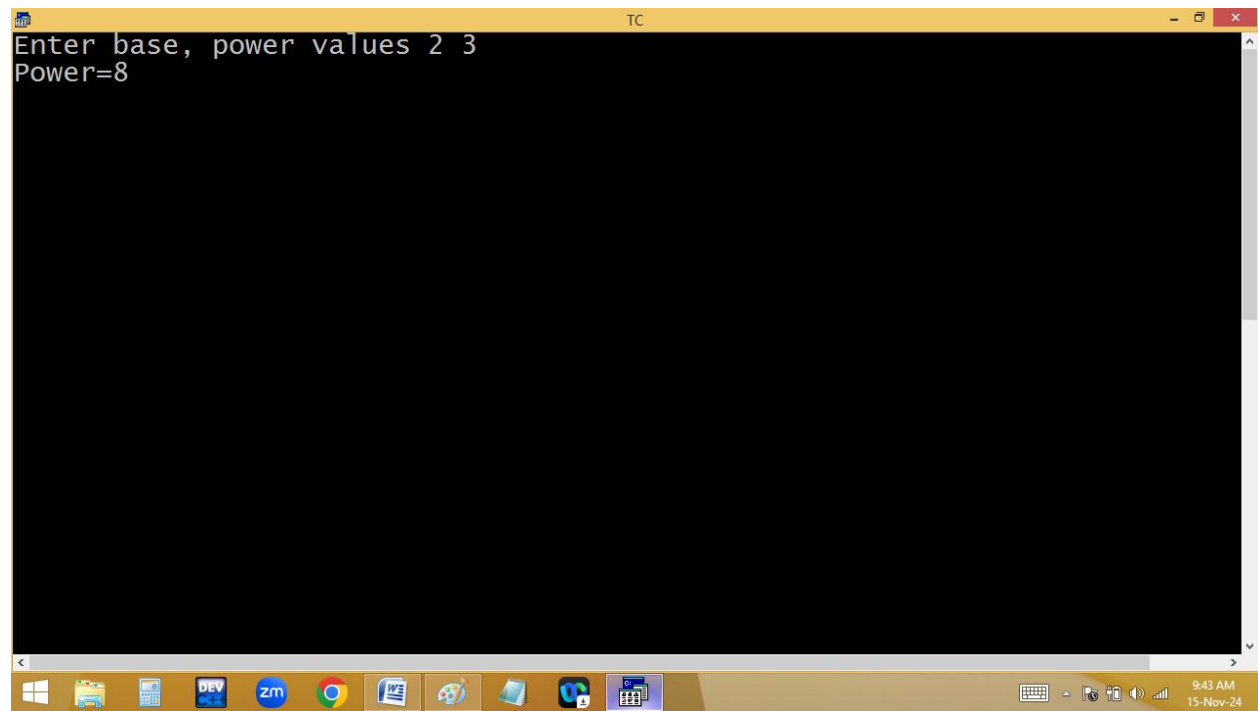
The image shows a Turbo C++ (TC) IDE with two windows. The top window displays the program's output, and the bottom window displays the source code.

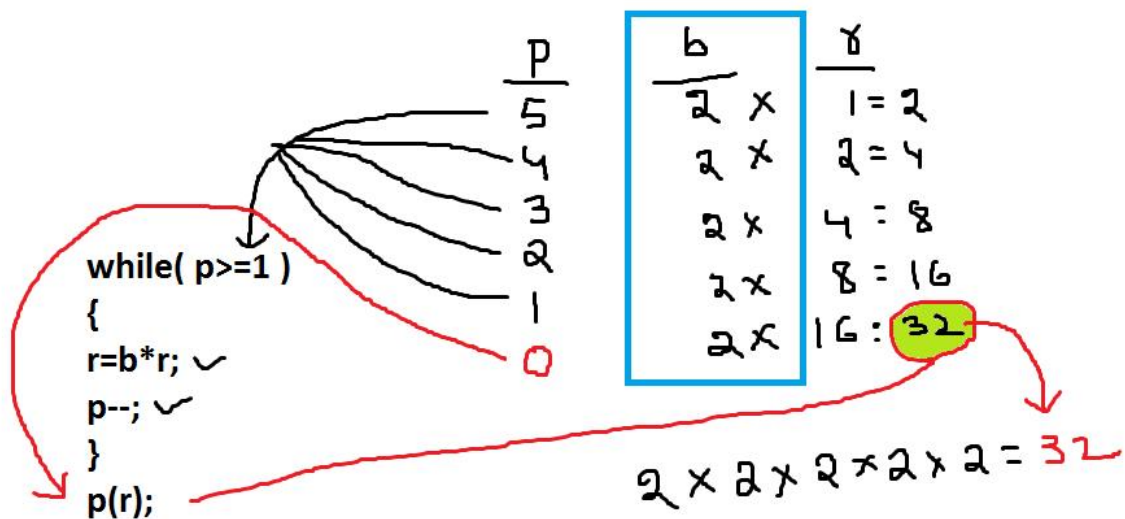
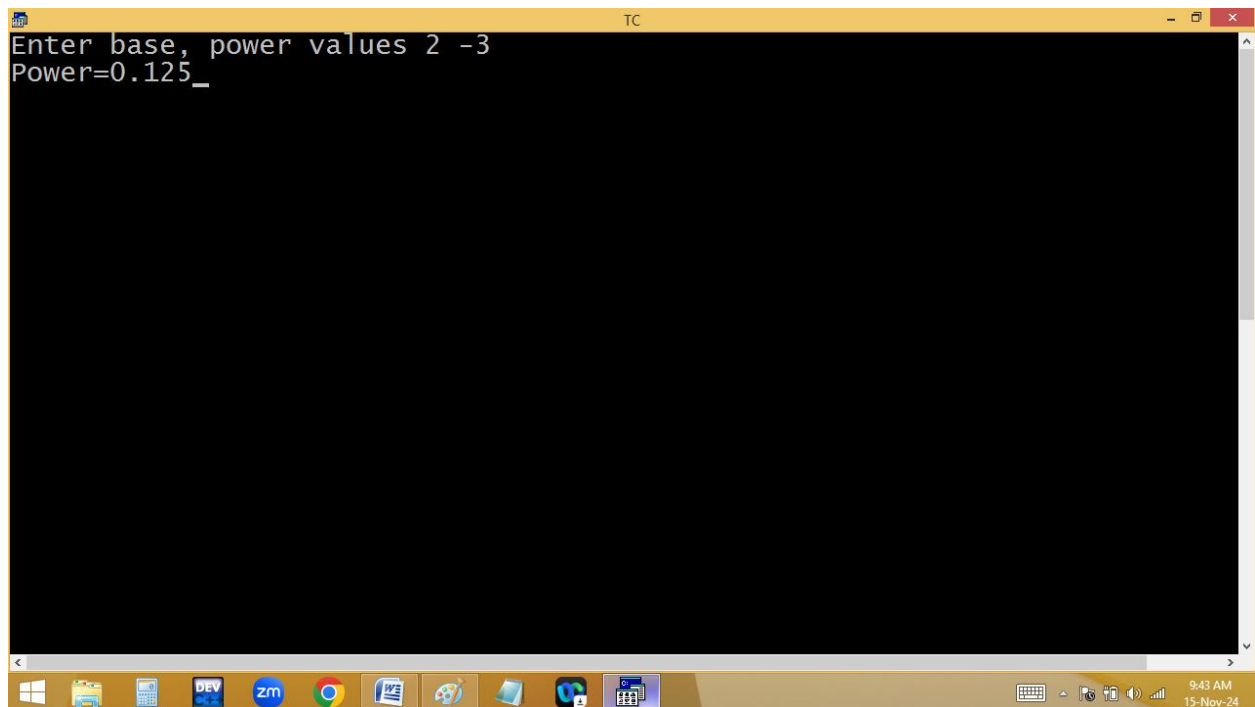
Top Window Output:

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

Bottom Window Source Code (E:9AM.C):

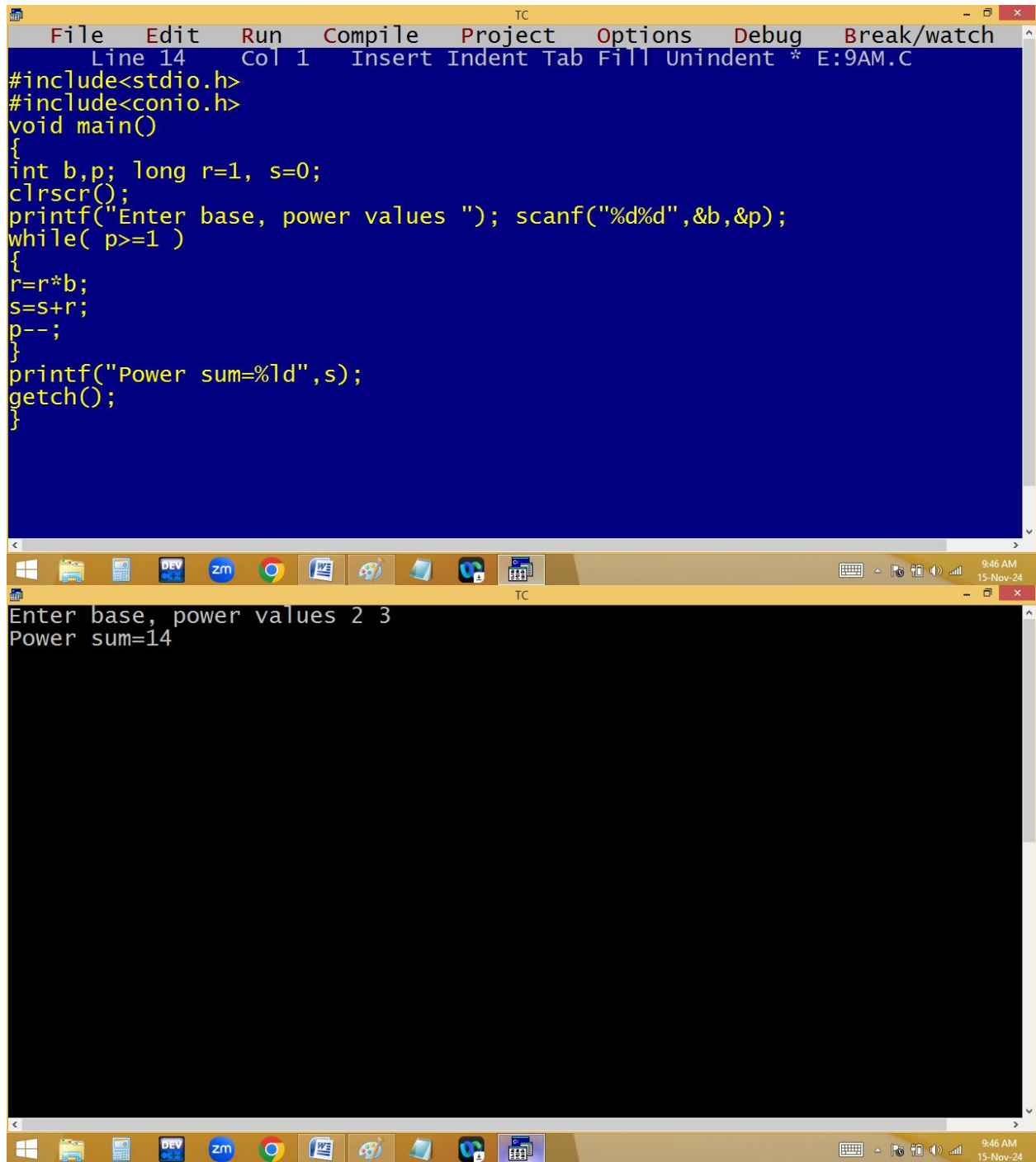
```
Line 14 Col 64 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
    int b,p; long r=1, n;
    clrscr();
    printf("Enter base, power values "); scanf("%d%d",&b,&p);
    if(p<0) {n=p; p=-p;}
    while( p>=1 )
    {
        r=r*b;
        p--;
    }
    if(n>=0) printf("Power=%ld",r);else printf("Power=%.3f",1.0/r);_
    getch();
}
```





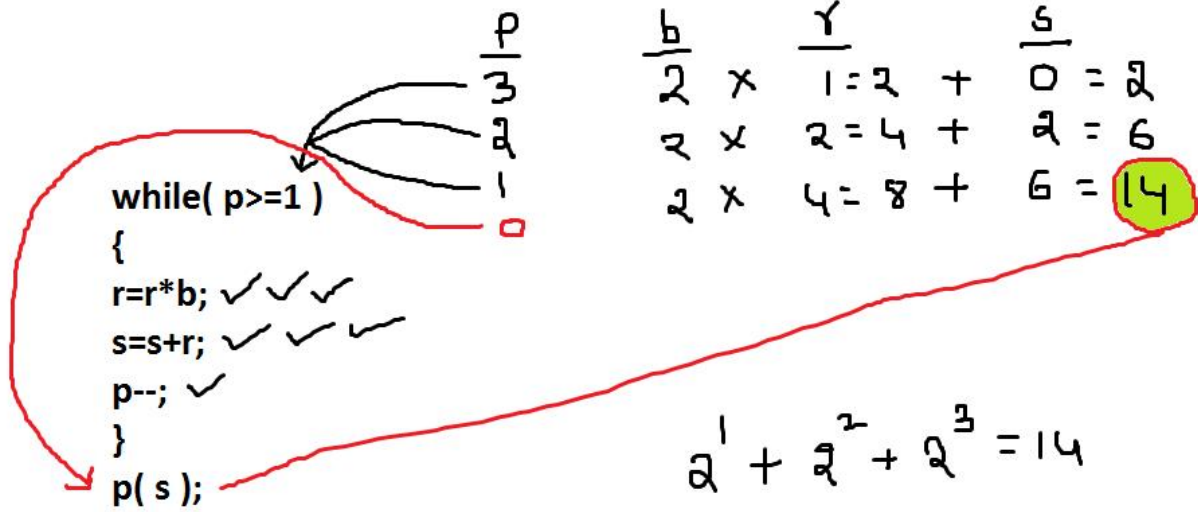
Find the powers sum:

$$2^3 = 2^1 + 2^2 + 2^3 = 2 + 4 + 8 = 14$$

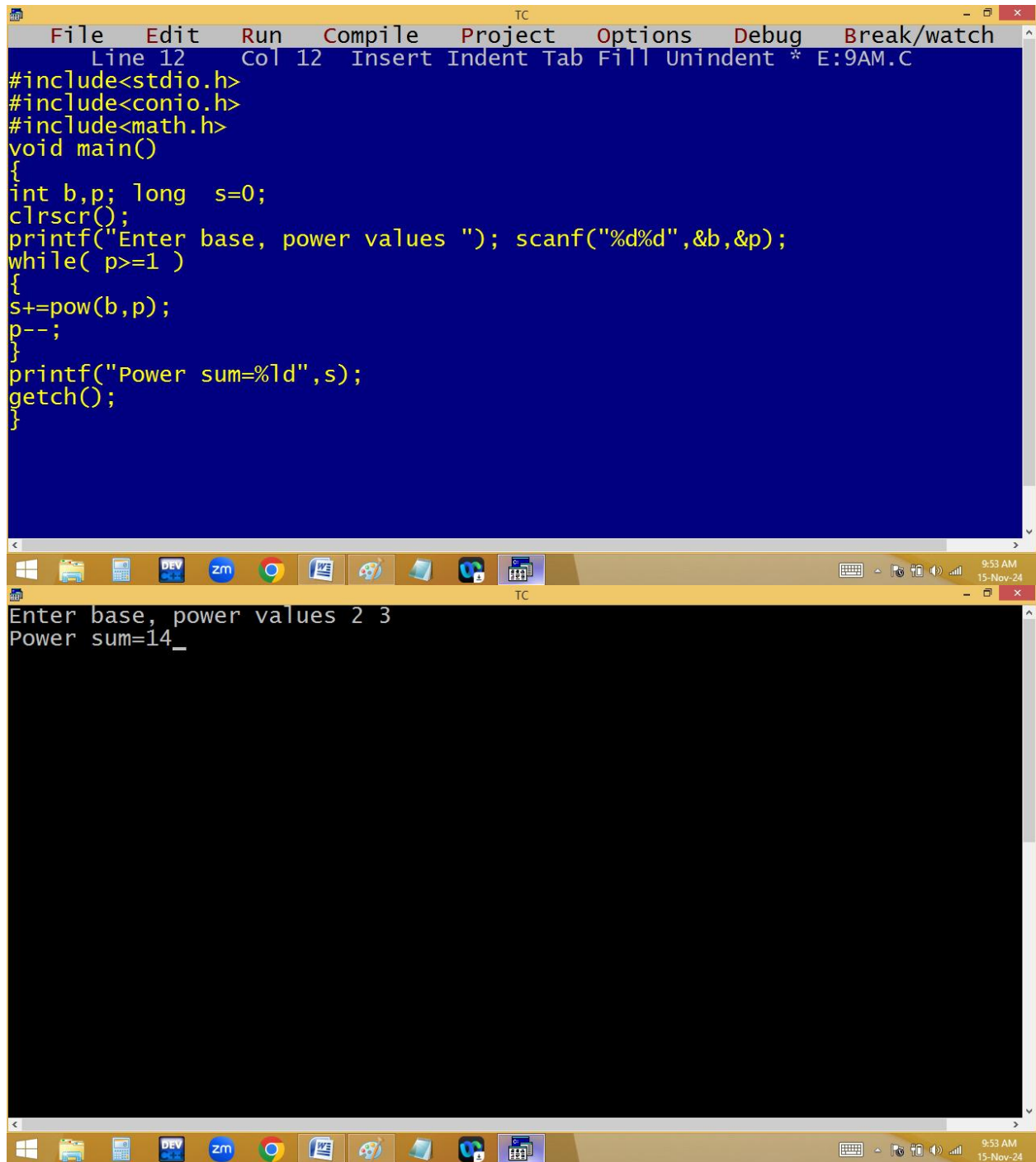


```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 14 Col 1 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int b,p; long r=1, s=0;
clrscr();
printf("Enter base, power values "); scanf("%d%d",&b,&p);
while( p>=1 )
{
r=r*b;
s=s+r;
p--;
}
printf("Power sum=%ld",s);
getch();
}
```

Enter base, power values 2 3
Power sum=14

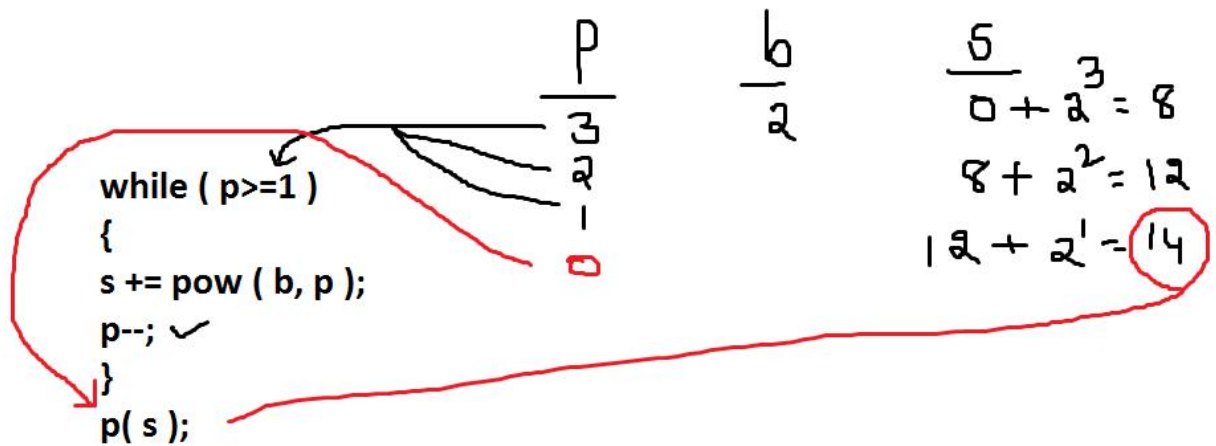


Using `pow()`:



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 12 Col 12 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
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--;
}
printf("Power sum=%ld",s);
getch();
}
```

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



Finding gcd /hcf of given two numbers:

Greatest common divisor / highest common factor

4 factors are 1, 2, 4

6 factors are 1, 2, 3, 6

The image shows two screenshots of the Turbo C++ (TC) IDE. The top screenshot displays the source code for a program that calculates the Greatest Common Divisor (GCD) of two numbers. The code is as follows:

```
File Edit Run Compile Project Options Debug Break/watch
Line 3 Col 1 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b,i=1,gcd;
clrscr();
printf("Enter two numbers "); scanf("%d%d",&a,&b);
while( i<=a && i<=b )
{
if(a%i==0 && b%i==0) gcd=i;
i++;
}
printf("gcd=%d",gcd);
getch();
}
```

The bottom screenshot shows the program's execution. The user has entered the numbers 4 and 6, and the program has output the GCD as 2.

```
TC
Enter two numbers 4 6
gcd=2_
```

The Windows taskbar at the bottom of both screenshots shows the time as 10:03 AM on 15-Nov-24. The taskbar includes icons for the Start menu, File Explorer, Task View, and several application windows, including a Dev C++ window, a Zoom window, and a Google Chrome window.

```
TC
Enter two numbers 10 15
gcd=5
```

Handwritten notes and calculations for finding GCD:

Annotations on the code:

- 3 4 $5 \leq 4$ (crossed out)
- $i < 4$ (crossed out)

Handwritten calculations:

a	i	b	i	gcd
4	1	6	1	✓
4	2	6	2	2 ✓
4	3			
4	4	6	4	2

Final result: $5 \leq 4$ (crossed out)

Finding lcm of given two numbers: [least common multiple]

Using gcd:

$$a * b / \text{gcd} = \text{lcm}$$

$$4 * 6 = 24 / 2 = 12$$

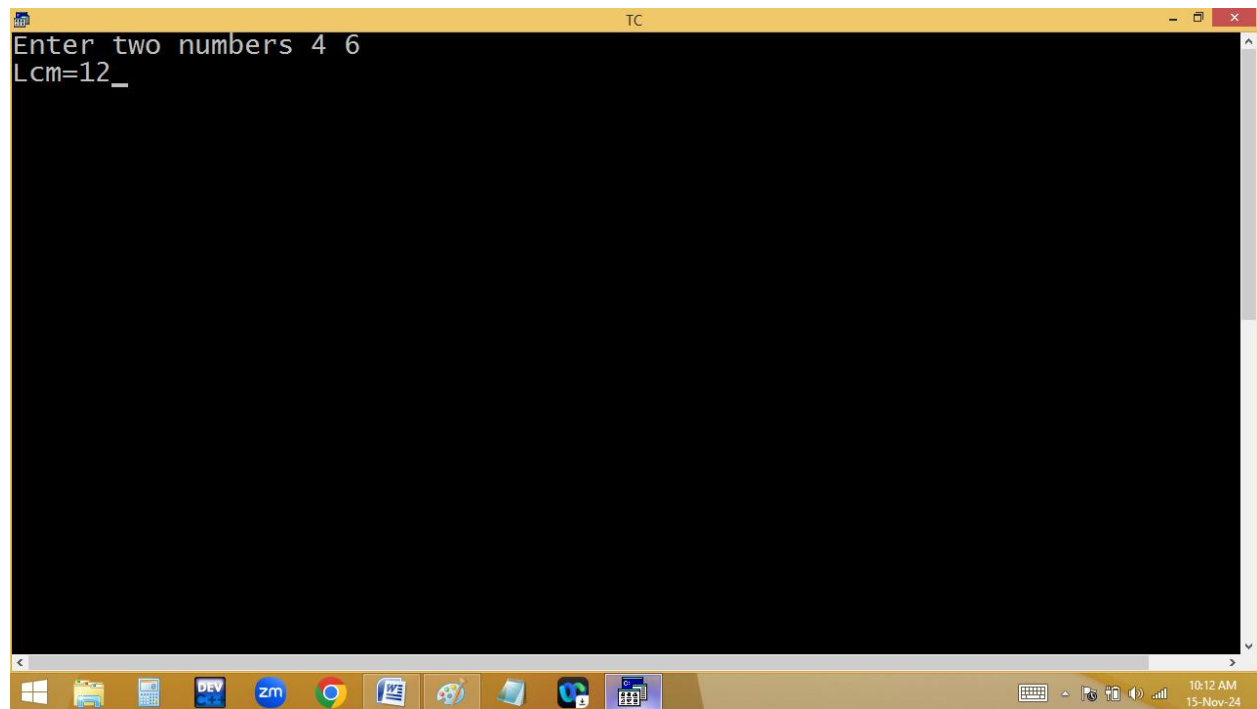
$$5*3=15/1=15$$

The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays the source code for a C program that calculates the Least Common Multiple (LCM) and Greatest Common Divisor (GCD) of two numbers. The code is as follows:

```
Line 13 Col 21 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b,i=1,gcd;
clrscr();
printf("Enter two numbers "); scanf("%d%d",&a,&b);
while( i<=a && i<=b )
{
if(a%i==0 && b%i==0) gcd=i;
i++;
}
printf("Lcm=%d",a*b/gcd);
getch();
}
```

The bottom window shows the program's execution. It prompts the user to "Enter two numbers" and shows the input "3 5". The output is "Lcm=15".

Enter two numbers 3 5
Lcm=15



The image shows a screenshot of a Turbo C++ (TC) window. The window has a yellow title bar with the text "TC" in the center. The main area is black, and the text "Enter two numbers 4 6" and "Lcm=12_" is displayed in white. The Windows taskbar is visible at the bottom, showing various application icons and the system clock indicating 10:12 AM on 15-Nov-24.

```
Enter two numbers 4 6
Lcm=12_
```

Method 2 [without using gcd]:


The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays the source code for a program that calculates the Least Common Multiple (LCM) of two numbers. The code is as follows:

```
File Edit Run Compile Project Options Debug Break/watch
Line 14 Col 1 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b, max;
clrscr();
printf("Enter two numbers "); scanf("%d%d",&a,&b);
max = a > b ? a : b ;
while( 1 )
{
if(max%a==0 && max%b==0) {printf("Lcm=%d",max);break;}
max++;
}
getch();
}
```

The bottom window shows the program's execution. It prompts the user to "Enter two numbers" and shows the input "4 6". The output is "Lcm=12_".

Enter two numbers 4 6
Lcm=12_

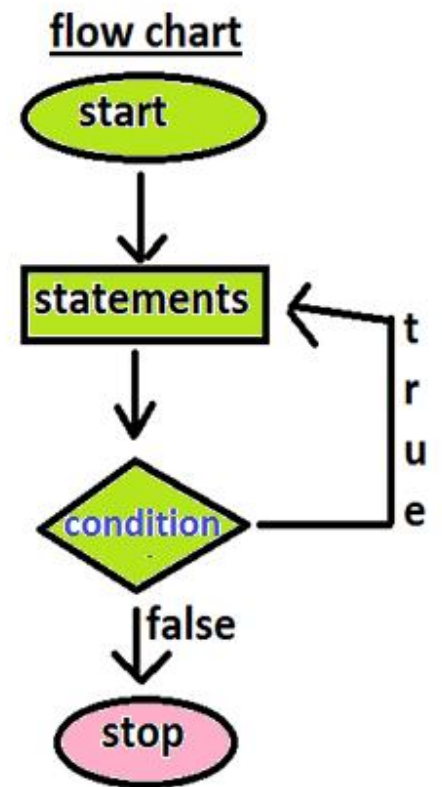
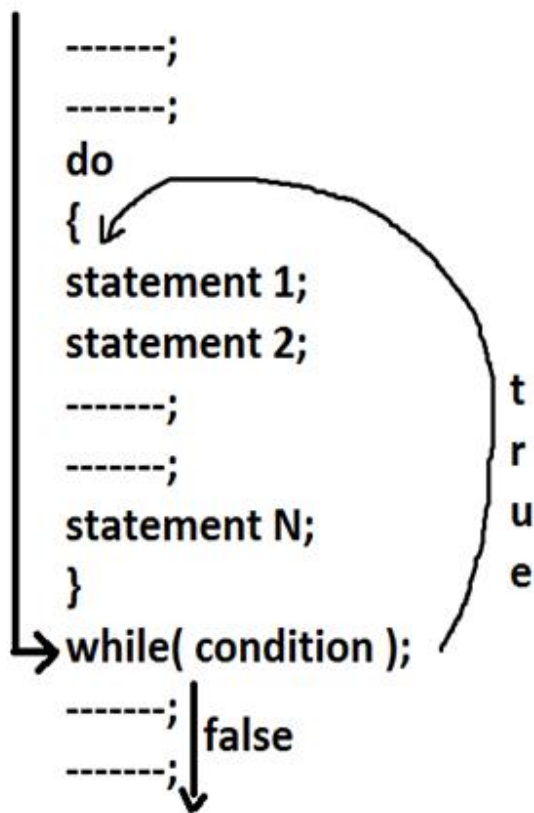
<u>max</u>	<u>a</u>	<u>max</u>	<u>b</u>
6	$\% 4 = 2$	6	6
7	$\% 4 = 3$		
8	$\% 4 = 0$	8	$\% 6 = 2$
9	$\% 4 = 1$		
10	$\% 4 = 2$		
11	$\% 4 = 3$		
12	$\% 4 = 0$	12	$\% 6 = 0$



do .. while:

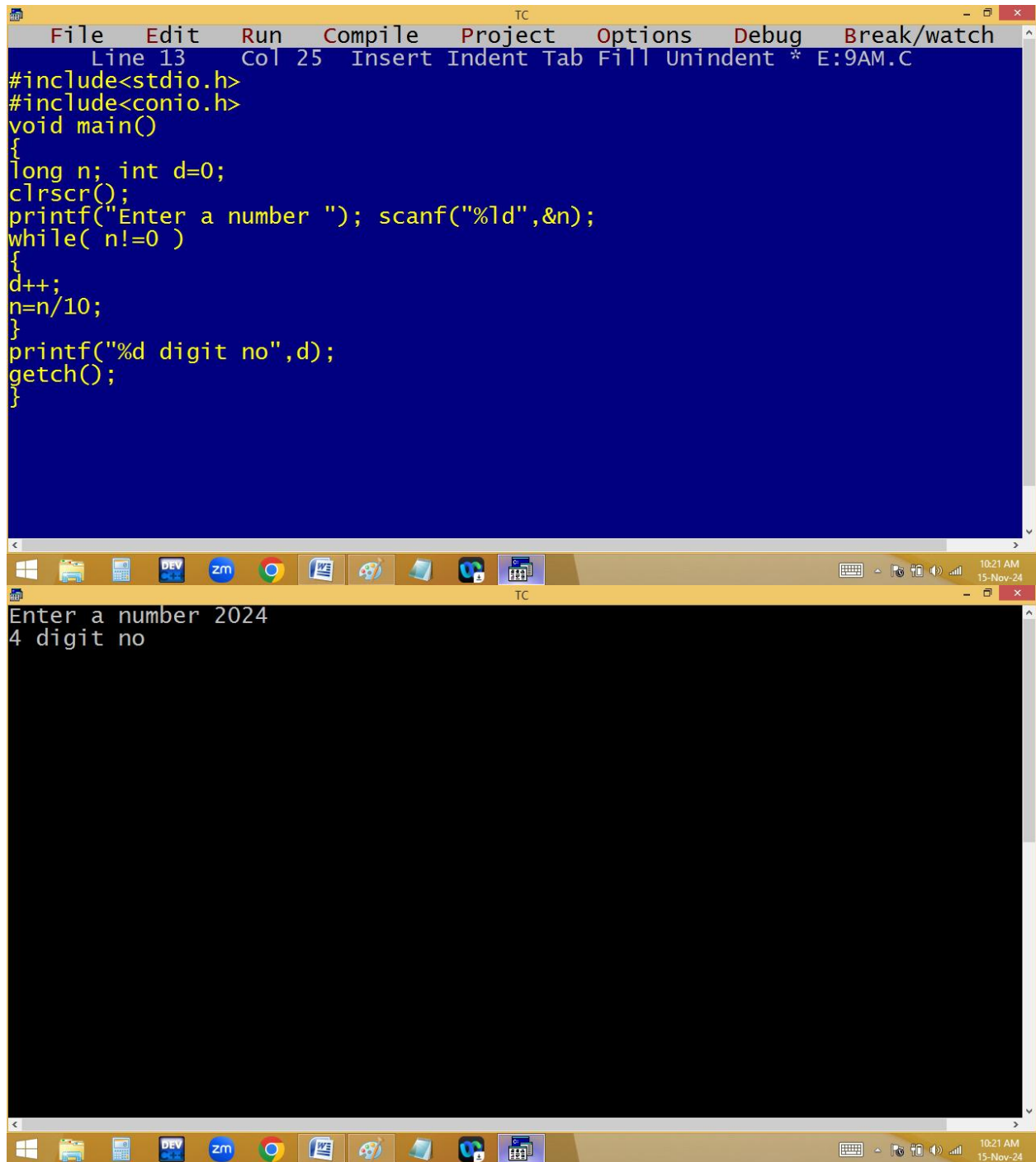
- It is an exit control loop. i.e. in a do while the condition is tested at last.
- Here do , while are the keywords.
- It is also used to repeat a program several times based on a condition.

- In a do while, do block statements are executed first and later while condition is tested. If the while condition is true then once again the do block statements are repeated. Like this the process is continued until the while condition becomes false.
- In do while, the while should be end with semicolon (;) .
- Regardless of while condition, the do statements are executed at least one time. Due to this sometimes we are getting unwanted results [garbage values].
- Use do while whenever it is compulsory because of in do while the program is controlled at the bottom / last.



Find the no of digits in given no using a loop:

**Eg: 2075 → 4
digits**



The image shows two screenshots of the Turbo C++ (TC) IDE. The top screenshot displays the source code of a C program designed to count the number of digits in a given integer. The code uses a while loop to repeatedly divide the number by 10 until it reaches zero, incrementing a counter in the process. The bottom screenshot shows the program's execution, where the user has entered the number 2024, and the program has correctly outputted that it has 4 digits.

```
File Edit Run Compile Project Options Debug Break/watch
Line 13 Col 25 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
long n; int d=0;
clrscr();
printf("Enter a number "); scanf("%ld",&n);
while( n!=0 )
{
d++;
n=n/10;
}
printf("%d digit no",d);
getch();
}
```

Enter a number 2024
4 digit no

```
TC
Enter a number 1234567890
10 digit no_
```

```
TC
Enter a number 9
1 digit no_
```

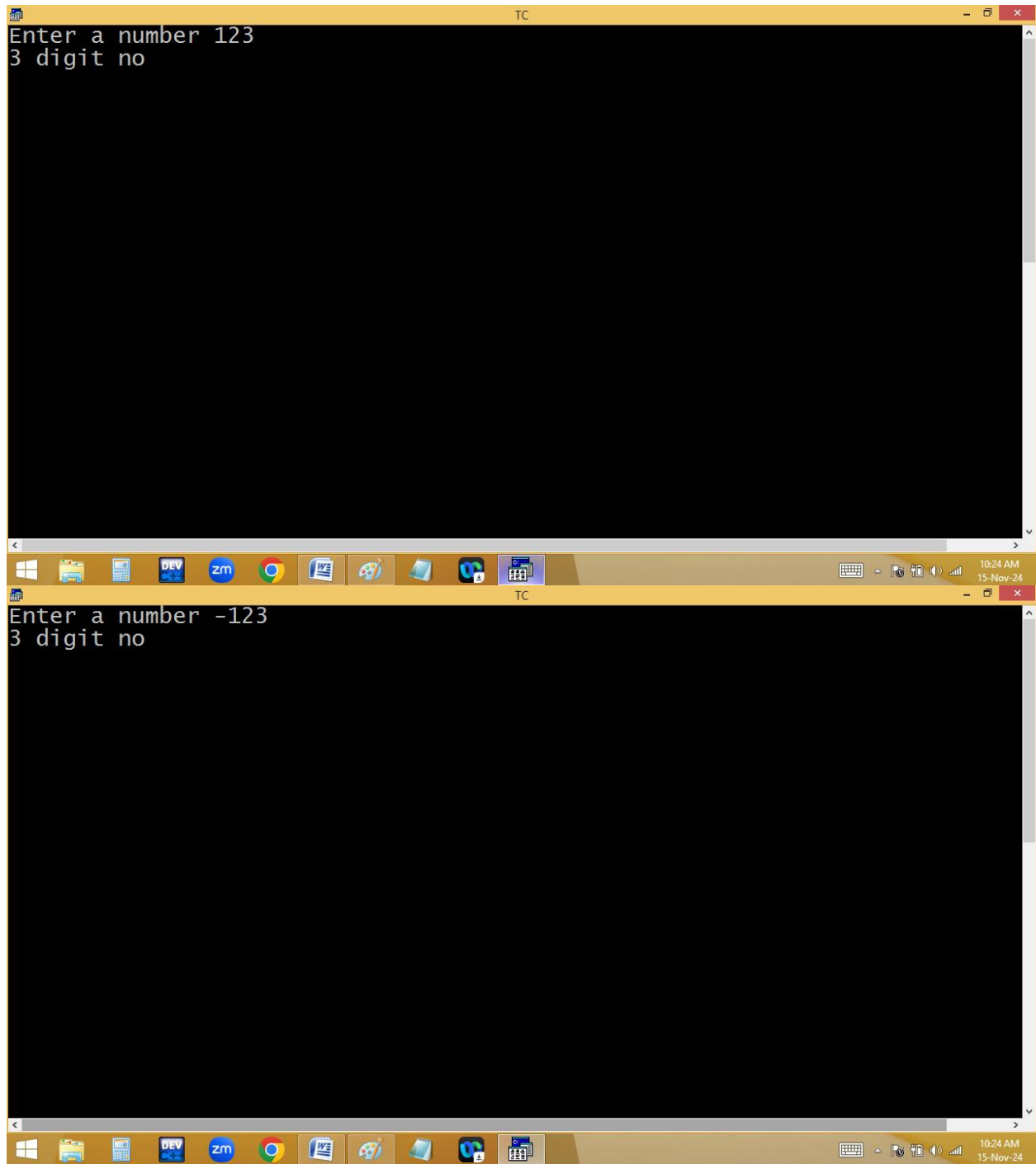
```
TC
Enter a number -125
3 digit no_
```

```
TC
Enter a number 0
0 digit no_
```

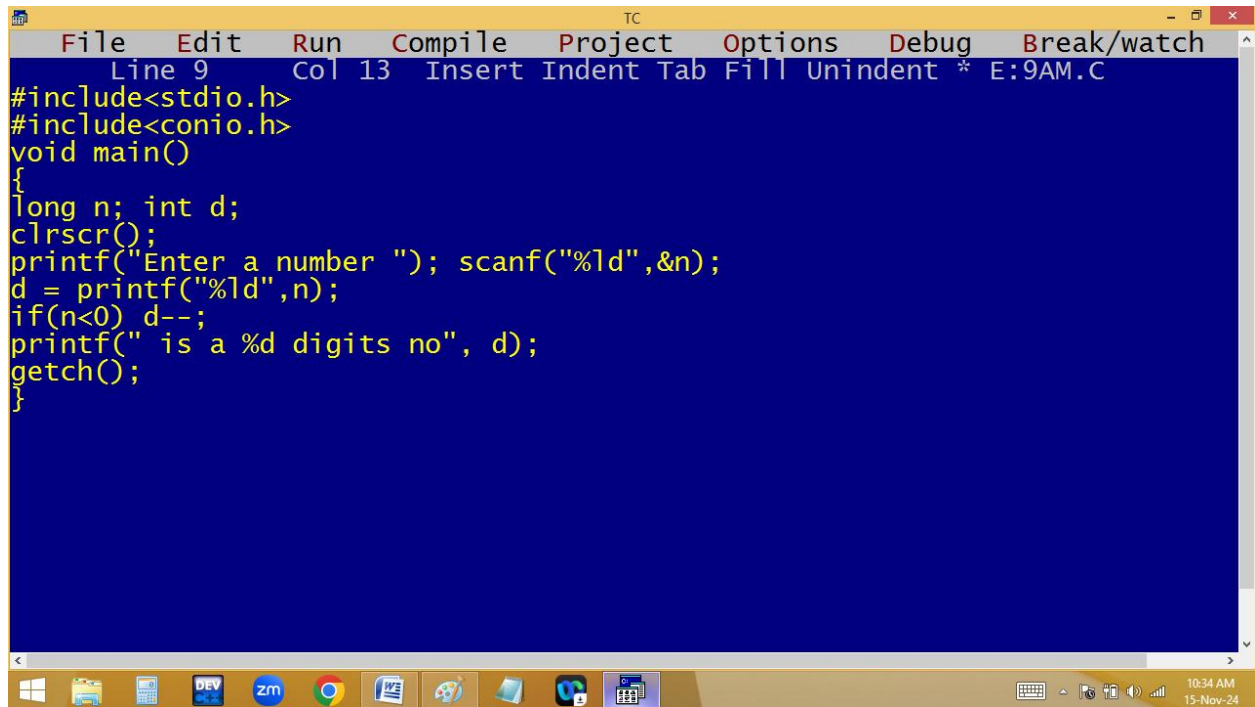

The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays the source code for a C program. The code includes headers for `stdio.h` and `conio.h`, and defines a `main` function. Inside `main`, a `long` variable `n` and an `int` variable `d` are declared and initialized to 0. The screen is cleared using `clrscr()`. A prompt "Enter a number " is followed by a `scanf` call to read a long integer into `n`. A `do-while` loop is used to extract the digits of `n` one by one. In each iteration, `d` is incremented, `n` is divided by 10, and the digit is printed with the label "digit no". The loop continues until `n` becomes 0. A `getch()` call is used to pause the program before exiting.

```
File Edit Run Compile Project Options Debug Break/watch
Line 13 Col 13 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
long n; int d=0;
clrscr();
printf("Enter a number "); scanf("%ld",&n);
do
{
d++;
n=n/10;
}while(n!=0);
printf("%d digit no",d);
getch();
}
```

The bottom window shows the program's execution. It displays the prompt "Enter a number 0" and the output "1 digit no". The taskbar at the bottom of the screen shows various application icons and the system clock indicating 10:24 AM on 15-Nov-24.

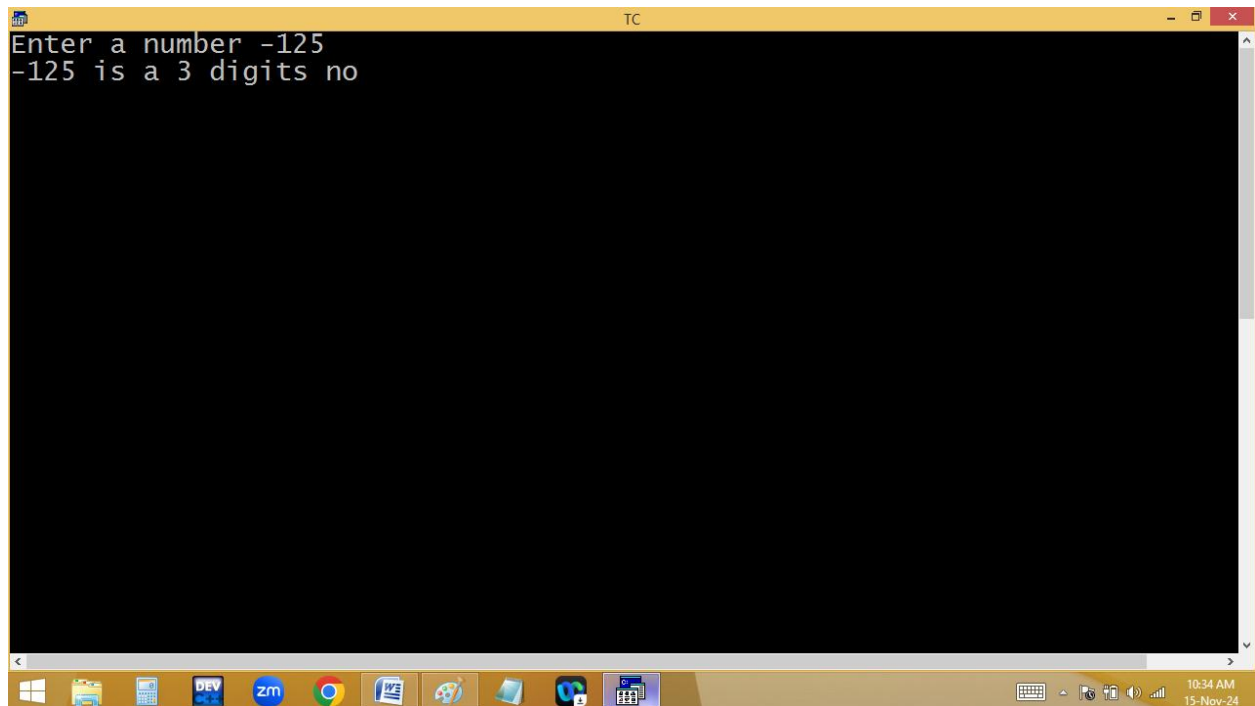


Without loop/ goto label:



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 9, Col 13, and the file name E:9AM.C. The code is as follows:

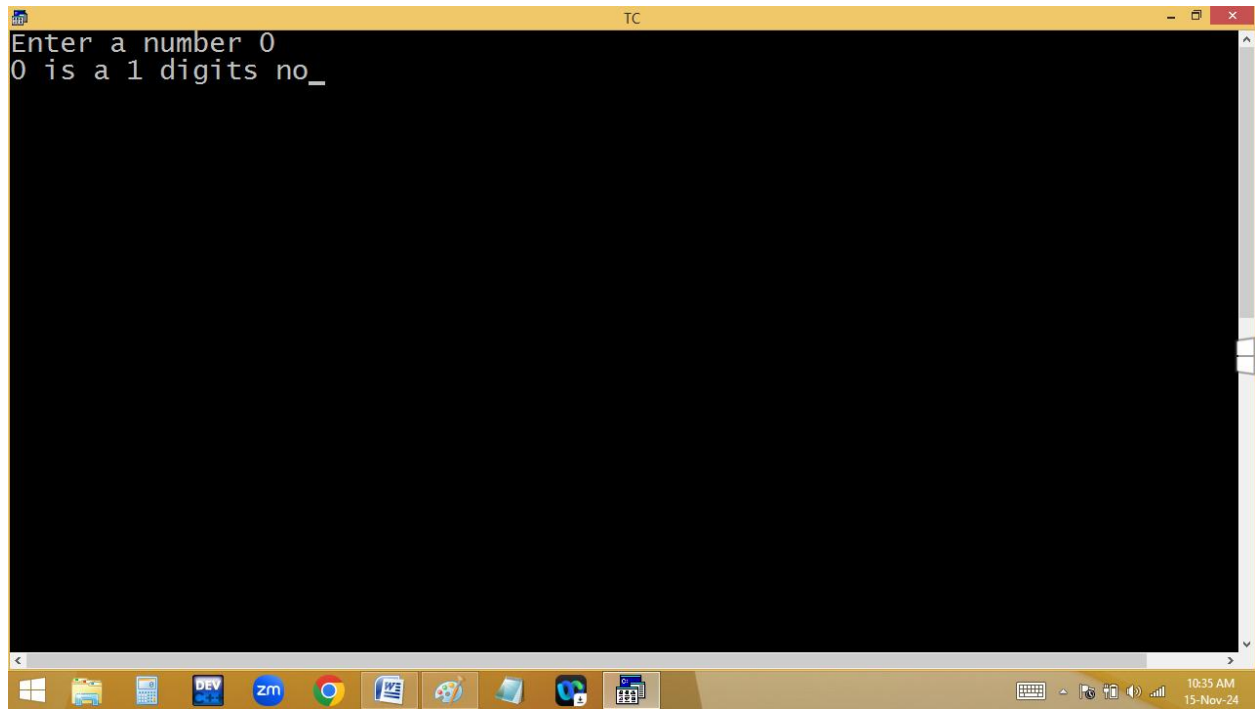
```
#include<stdio.h>
#include<conio.h>
void main()
{
    long n; int d;
    clrscr();
    printf("Enter a number "); scanf("%ld",&n);
    d = printf("%ld",n);
    if(n<0) d--;
    printf(" is a %d digits no", d);
    getch();
}
```



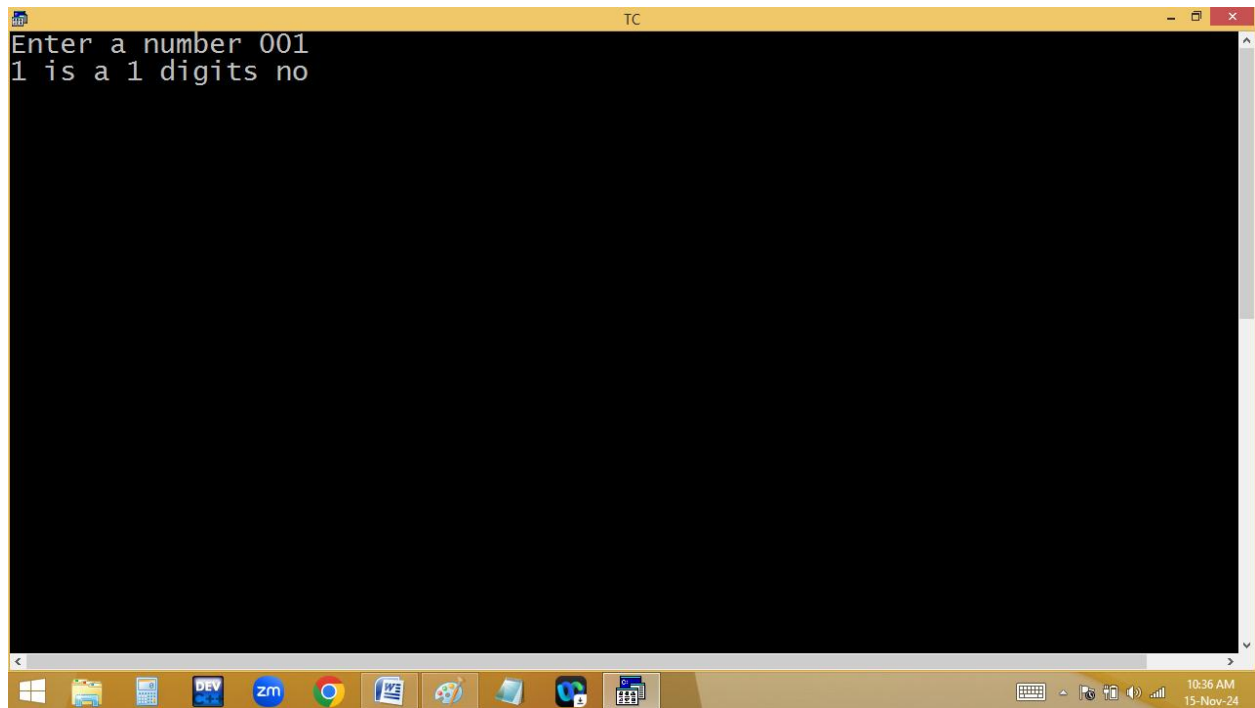
The screenshot shows the Turbo C++ (TC) IDE with a black background, displaying the output of the program. The status bar at the bottom indicates 10:34 AM on 15-Nov-24. The output is as follows:

```
Enter a number -125
-125 is a 3 digits no
```

```
TC
Enter a number 0
0 is a 1 digits no_
```



```
TC
Enter a number 001
1 is a 1 digits no
```



$$\begin{array}{r} n \\ \hline 125 \end{array}$$

$$\begin{array}{r} 3 \\ \hline 125 \end{array}$$

$c = \text{printf}(\text{"\%ld", } n \text{);}$

$p(\text{" is a } \underline{3} \text{ digits no", } c \text{);}$

Finding first and last digits of given no:

Eg: 2017 → 7 is last digit and 2 is first digit.

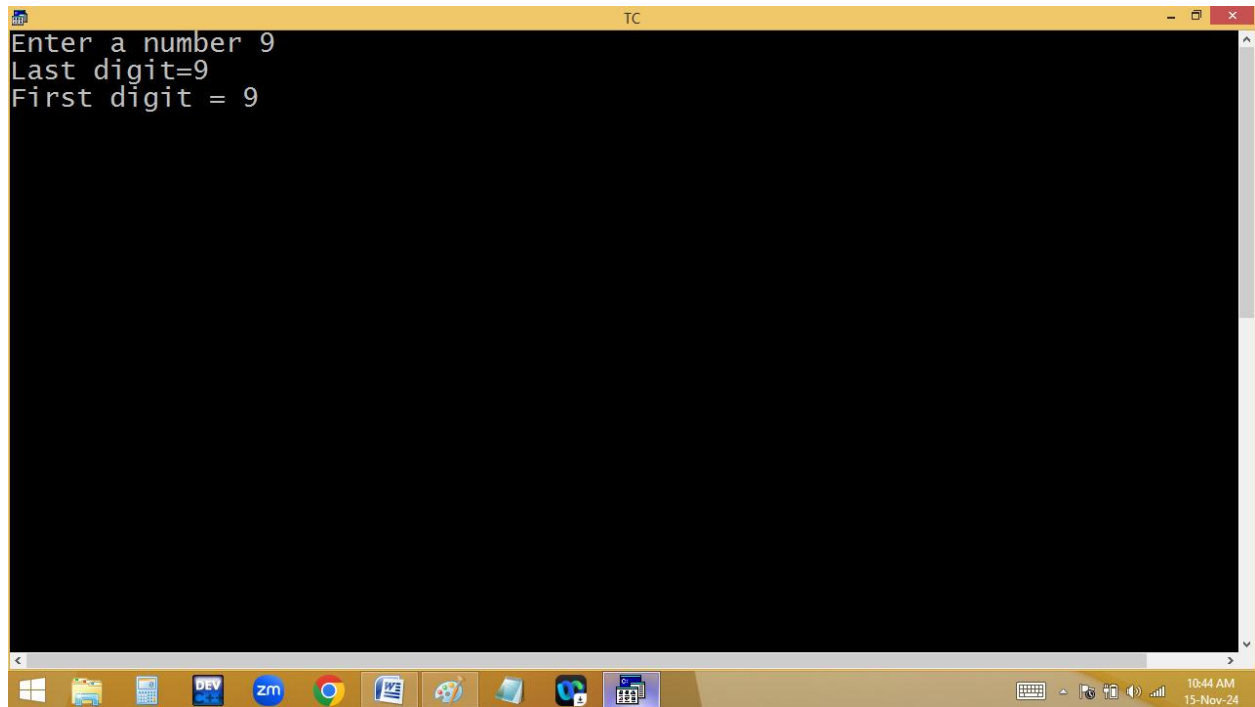
```

TC
File Edit Run Compile Project Options Debug Break/watch
Line 9 Col 16 Insert Indent Tab Fill Unindent * E:9AM.C
#include<stdio.h>
#include<conio.h>
void main()
{
long n;;
clrscr();
printf("Enter a number "); scanf("%ld",&n);
printf("Last digit=%d\n",n%10);
while(n>9||n<-9) n=n/10;
printf("First digit = %d",n);
getch();
}

```

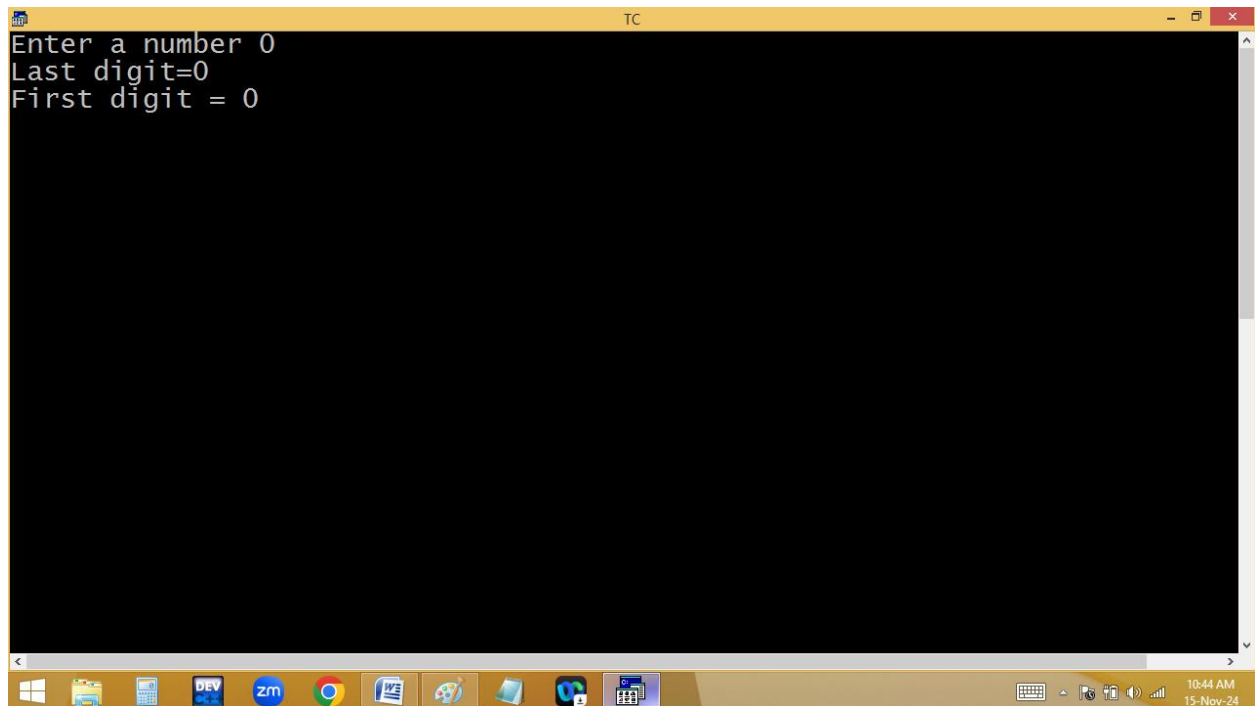
```
TC
Enter a number -123
Last digit=-3
First digit = -1_
```

```
TC
Enter a number 2913
Last digit=3
First digit = 2_
```



A screenshot of a Turbo C++ (TC) window. The window has a yellow title bar with the text "TC" in the center. The main area is black with white text. The text displayed is: "Enter a number 9", "Last digit=9", and "First digit = 9". The window is part of a Windows desktop environment, with a taskbar at the bottom showing various icons including Windows, File Explorer, DEV, zm, Chrome, Word, Paint, and a folder icon. The system tray on the right shows the time as 10:44 AM and the date as 15-Nov-24.

```
Enter a number 9
Last digit=9
First digit = 9
```



A screenshot of a Turbo C++ (TC) window, similar to the one above. The window has a yellow title bar with the text "TC" in the center. The main area is black with white text. The text displayed is: "Enter a number 0", "Last digit=0", and "First digit = 0". The window is part of a Windows desktop environment, with a taskbar at the bottom showing various icons including Windows, File Explorer, DEV, zm, Chrome, Word, Paint, and a folder icon. The system tray on the right shows the time as 10:44 AM and the date as 15-Nov-24.

```
Enter a number 0
Last digit=0
First digit = 0
```

Home work:

Finding max, min digits of given no.

2715 → 7 max, 1 min

100 → 001

Printf("100 reverse is 001");

102 → One Zero Two