

ARRAYS

It is collection of homogeneous [same type] variables.

Array is nothing but collection of contiguous memory locations, where we can store and manage more than one value of same type under one name.

It is a derived data type.

It is an implicit / internal pointer.

It is a implicit const pointer

It is one of data structure.

Advantages:

Generally to store several values of same type, we have to declare several variables. Here we have to remember all these variable names also. When the program is too big, it is very difficult to remember all the variable names. In this situation, the only solution is array.

Array reduce program length.

Array minimize the errors.

In functions to carry several values of same type at a time, we are using arrays.

It allows to arrange our data in a order.

Disadvantage:

Array size is Constant Positive Integer value. Due to this we are not able to change the array size at run time. Sometimes it causes memory wastage / shortage.

In C language we are using

1. One dimensional arrays
2. Multi dimensional arrays

One dimensional arrays:

- An array with one row and several columns.
- An array with single subscripting operator **[]** is called one dimensional array.
- It is an implicit single pointer.

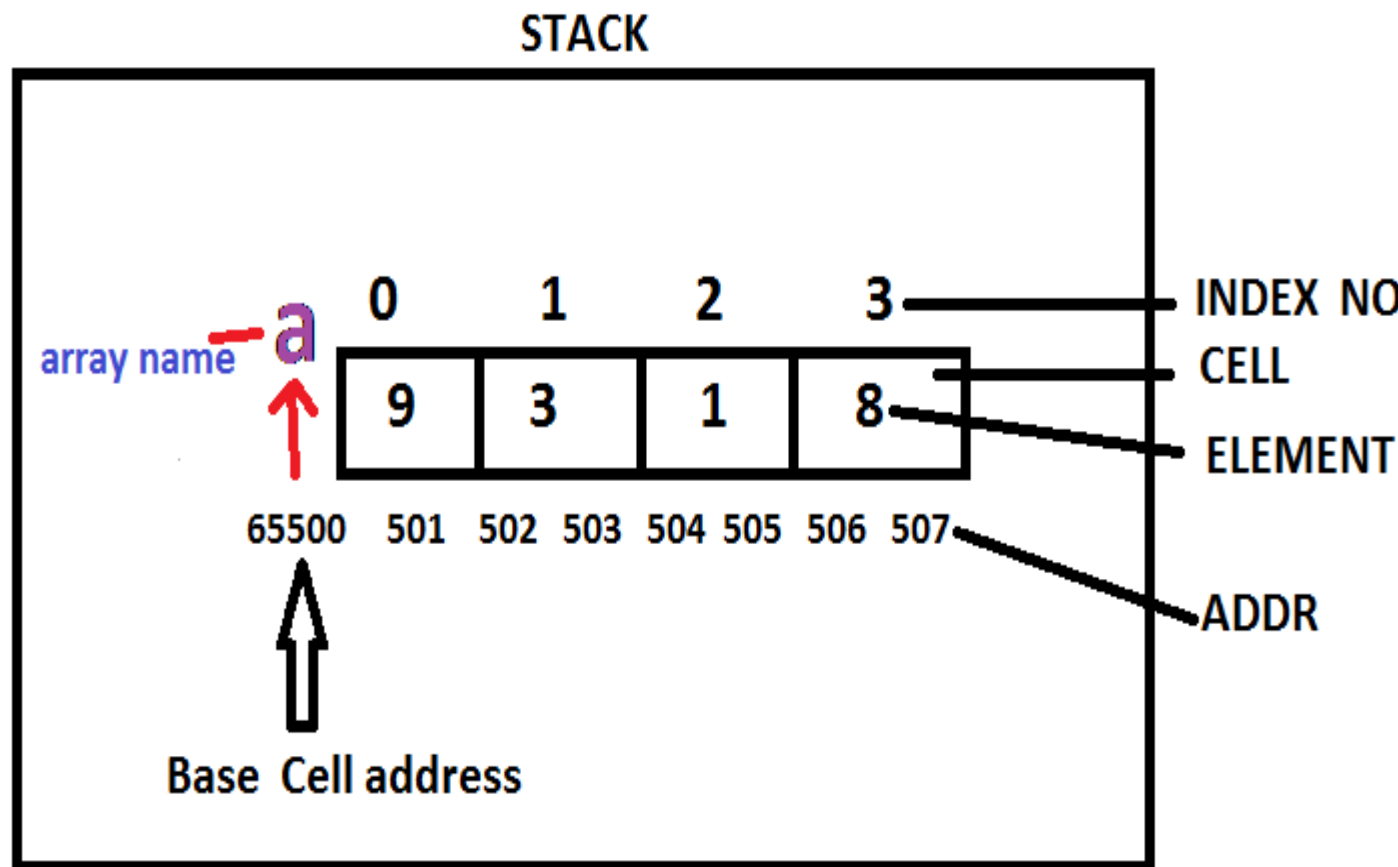
Syntax:

datatype variable[size] = {elements};

Eg:

```
int a[4] = { 9, 3, 1, 8 };
```

Memory allocation for array:



Array is implicit pointer because of array variable stores base cell [0 cell 1st byte] address. Hence array variable value and 0 cell address both are same.

Array declaration methods:

int a[3]; Ok

int a[]; No

int a[3]={1,2,3}; Ok

int a[]={1,2,3}; Ok

`int a[0]={1,2,3};` Ok

`int a[-5];` No

`int a[5.5];` No

`int n = 5, a[n];` No

`int a[3]={10,20};` Ok

`int a[3]={1, 2, 3, 4};` No

`int a[0];` error

`#define n 5 /* macro */`

`int a[n];` Ok

`const int n=5, a[n];` No

`int a[5>3];` → `int a[1];` Ok

`int a[3<2];` → `int a[0];` No

`int a[2+3];` → `int a[5];` Ok

`int a[5%3];` → `int a[2];` Ok

`int a[5%5];` → `int a[0];` No

`int a[1,2,3];` → error

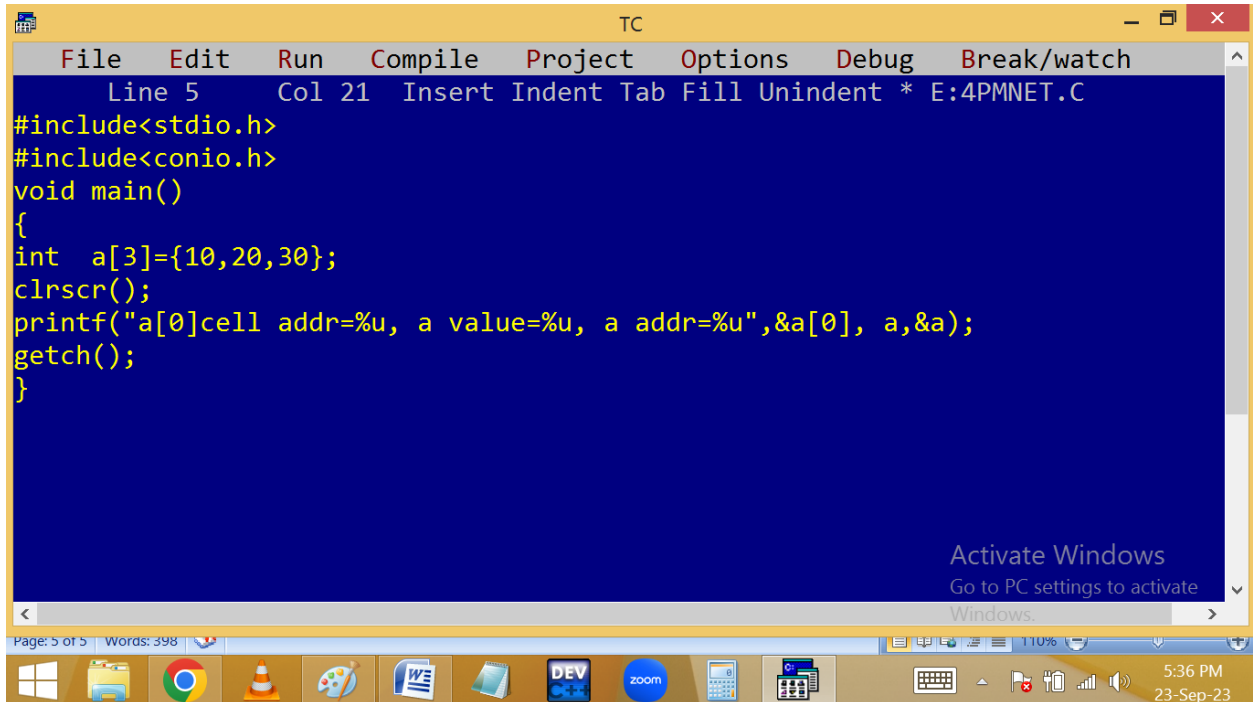
`int a[40000];` → $40000 * 2 = 80000$ bytes → No

Note: Stack size is 65536 bytes(64kb) Only.

`float a[10000];` Ok → $10000 * 4 = 40000$ bytes

`float a[20000];` No → $20000 * 4 = 80000$ bytes

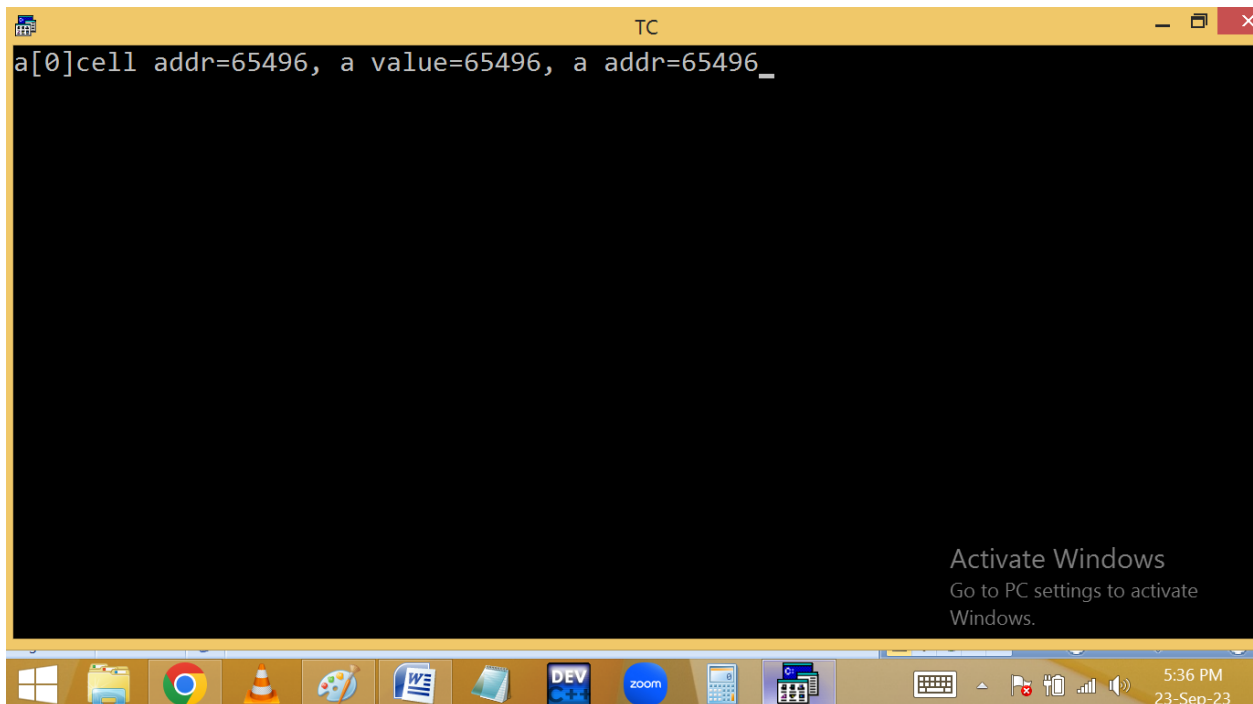
Finding array address:



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 21 Insert Indent Tab Fill Unindent * E:4PMNET.C'. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int  a[3]={10,20,30};
clrscr();
printf("a[0]cell addr=%u, a value=%u, a addr=%u",&a[0], a,&a);
getch();
}
```

The taskbar at the bottom shows various application icons, including Windows Explorer, Google Chrome, VLC media player, Paint, Word, and several development tools. The system clock in the bottom right corner shows 5:36 PM on 23-Sep-23. An 'Activate Windows' watermark is visible in the bottom right corner of the IDE window.

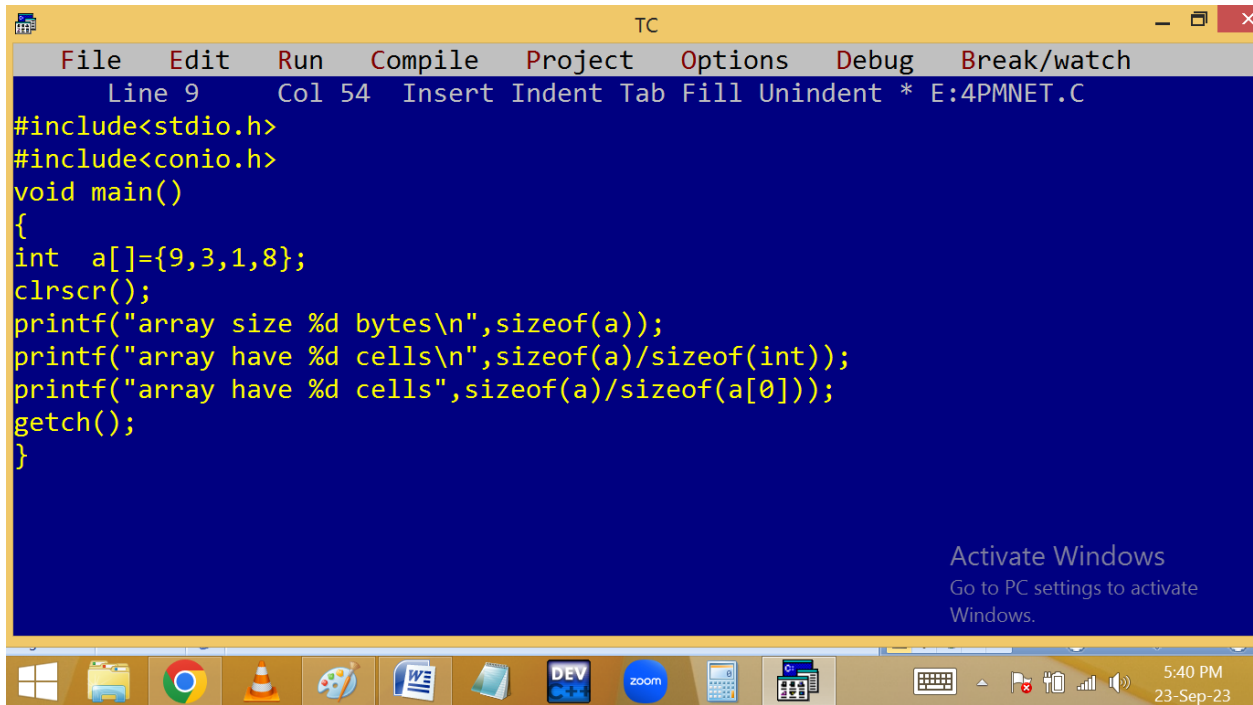


The screenshot shows the Turbo C++ (TC) IDE with a black background, displaying the output of the program. The output text is:

```
a[0]cell addr=65496, a value=65496, a addr=65496_
```

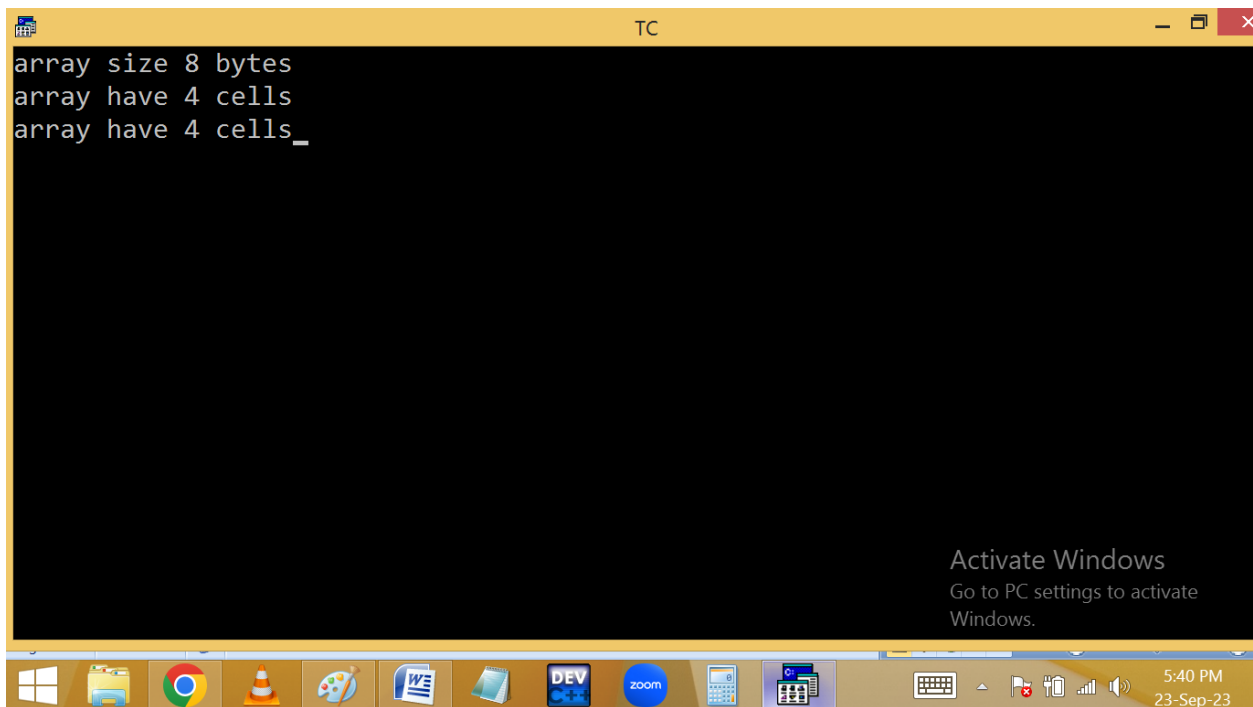
The taskbar and system clock are identical to the previous screenshot, showing 5:36 PM on 23-Sep-23. An 'Activate Windows' watermark is also present in the bottom right corner of the IDE window.

Finding array size:



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 9 Col 54 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[]={9,3,1,8};
clrscr();
printf("array size %d bytes\n",sizeof(a));
printf("array have %d cells\n",sizeof(a)/sizeof(int));
printf("array have %d cells",sizeof(a)/sizeof(a[0]));
getch();
}
```

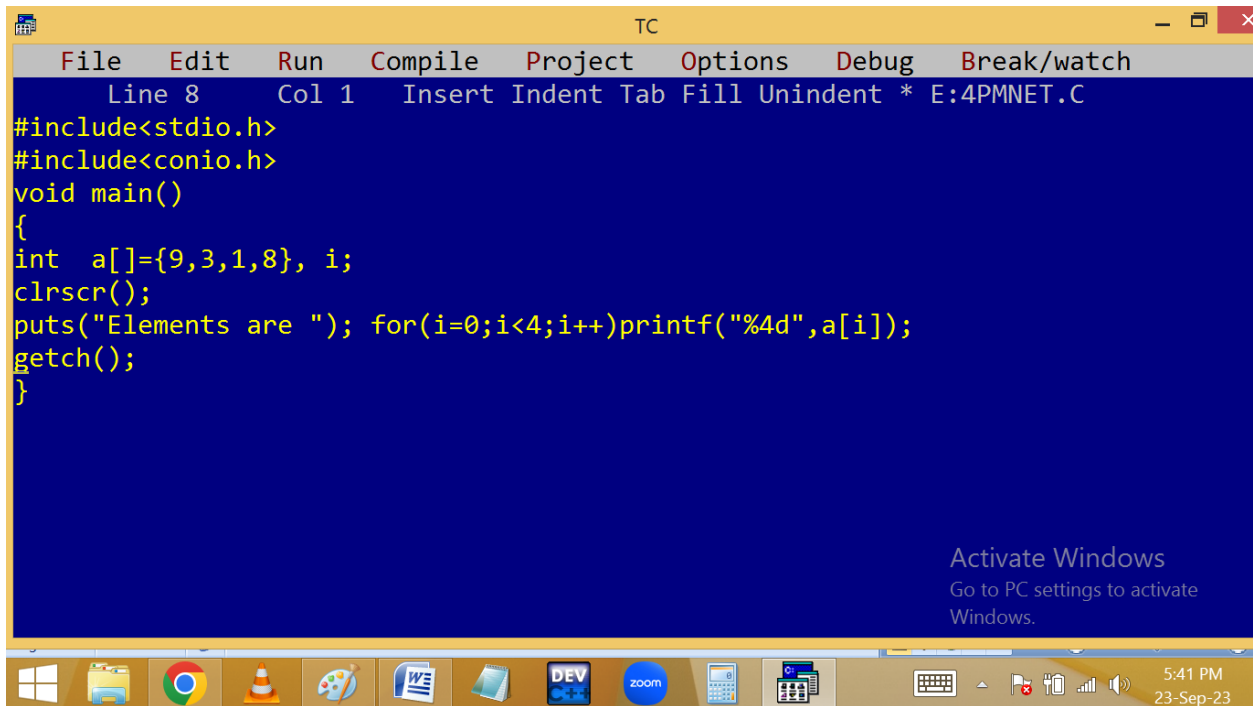
Activate Windows
Go to PC settings to activate Windows.



```
TC
array size 8 bytes
array have 4 cells
array have 4 cells_

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

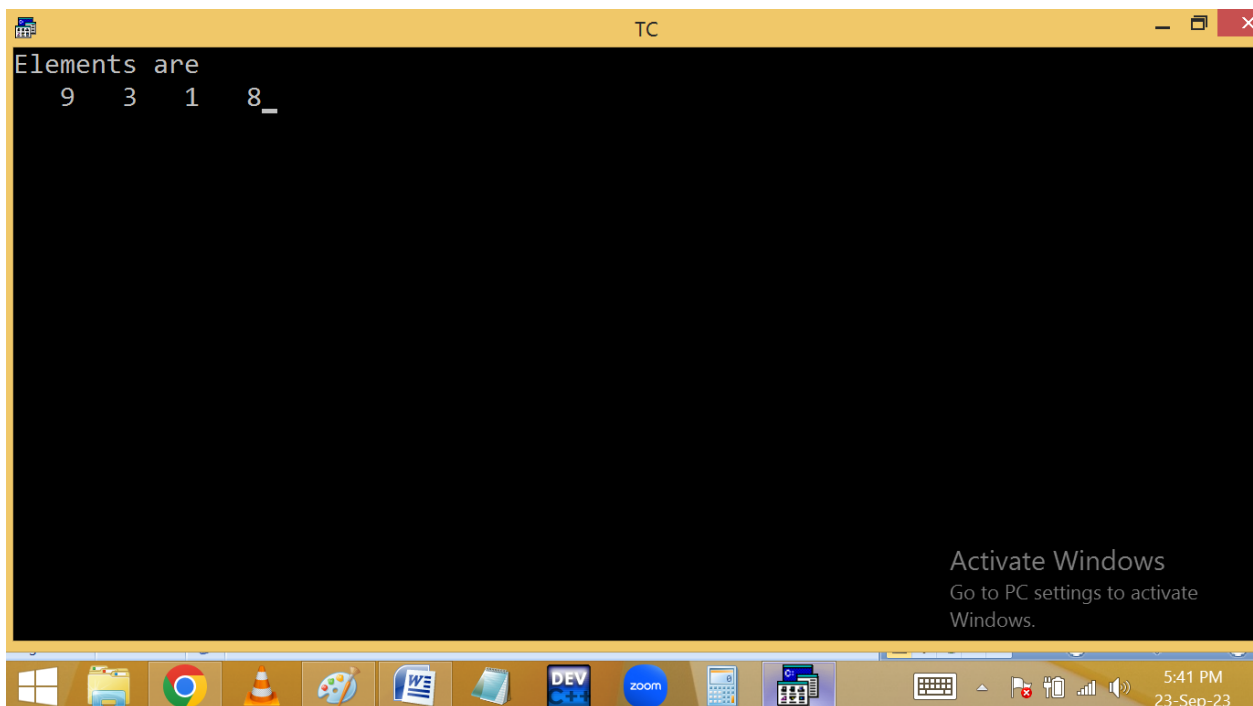
Direct initialization of array elements:



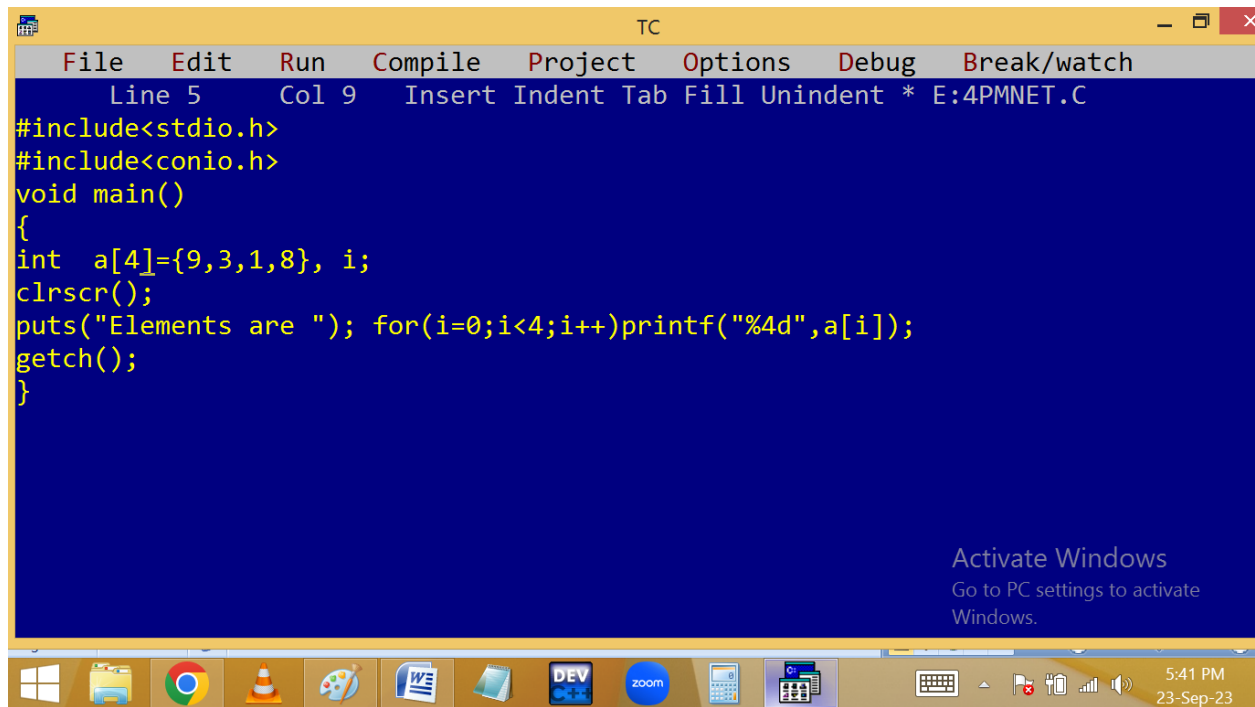
The screenshot shows the Turbo C++ (TC) IDE with a blue background. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the bottom indicates 'Line 8 Col 1' and 'Insert Indent Tab Fill Unindent * E:4PMNET.C'. The code in the editor is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int  a[]={9,3,1,8}, i;
clrscr();
puts("Elements are "); for(i=0;i<4;i++)printf("%4d",a[i]);
getch();
}
```

An 'Activate Windows' watermark is visible in the bottom right corner of the window.



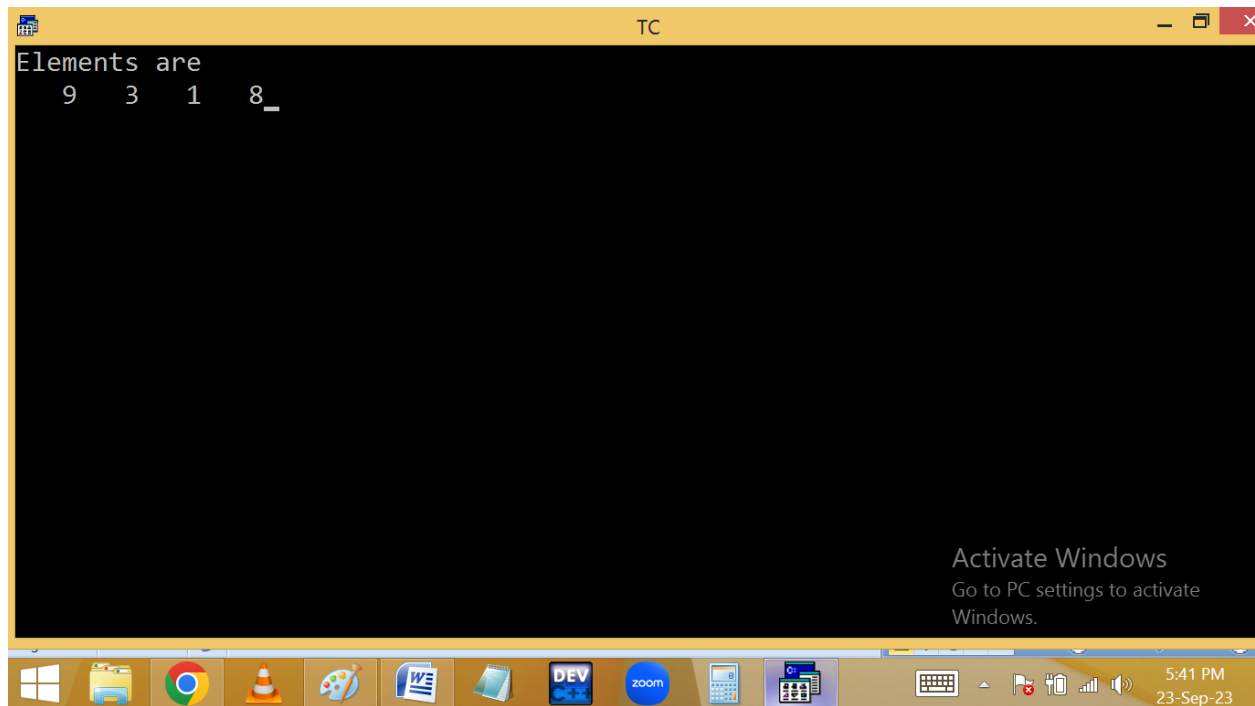
The screenshot shows the Turbo C++ (TC) IDE with a black background, displaying the output of the program. The text 'Elements are' is on the first line, and the second line shows the array elements '9 3 1 8' followed by a cursor underscore '_'. The status bar at the bottom indicates '5:41 PM' and '23-Sep-23'. An 'Activate Windows' watermark is visible in the bottom right corner of the window.



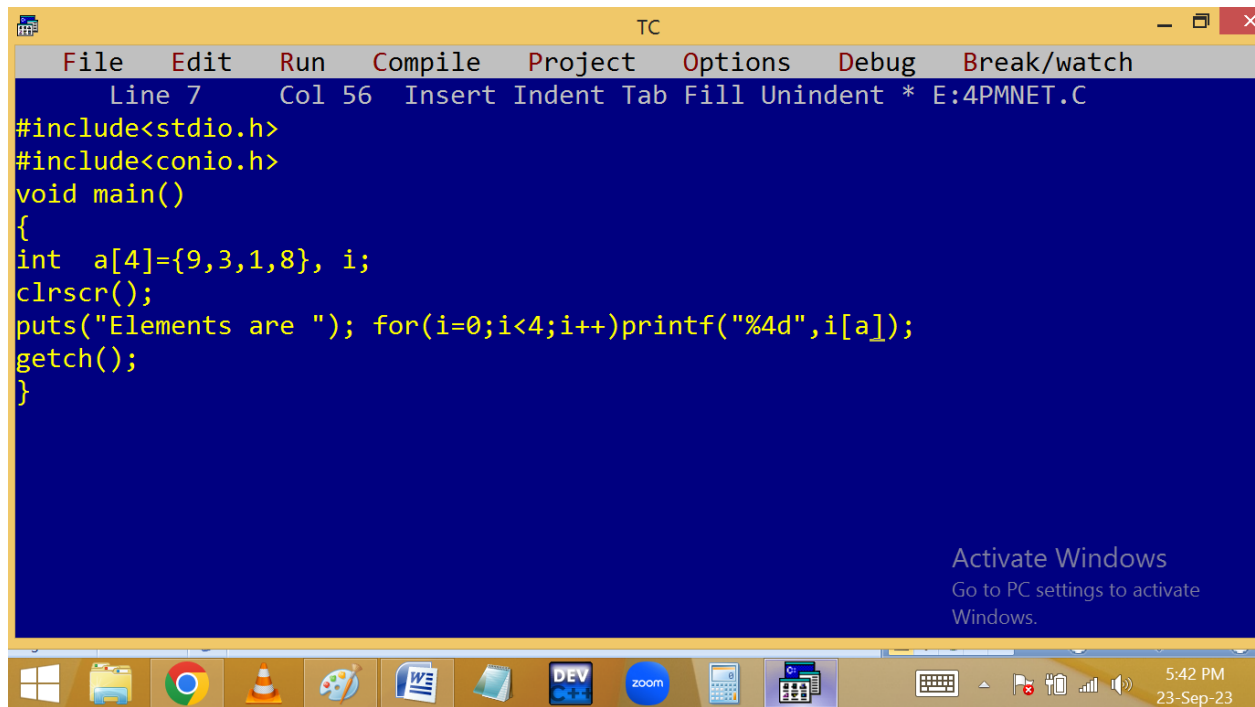
The screenshot shows the Turbo C++ (TC) IDE with a blue background. The menu bar includes File, Edit, Run, Compile, Project, Options, Debug, and Break/watch. The status bar at the bottom indicates Line 5, Col 9, and the file name E:4PMNET.C. The code is as follows:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int  a[4]={9,3,1,8}, i;
clrscr();
puts("Elements are "); for(i=0;i<4;i++)printf("%4d",a[i]);
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 set to 5:41 PM on 23-Sep-23.



The screenshot shows the same Turbo C++ IDE window, but now displaying the output of the program. The text "Elements are" is printed on the first line, and the numbers "9 3 1 8_" are printed on the second line, each separated by a space. The "Activate Windows" watermark is still present in the bottom right corner. The Windows taskbar at the bottom remains the same, showing the system clock at 5:41 PM on 23-Sep-23.



```
TC
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 56 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8}, i;
clrscr();
puts("Elements are "); for(i=0;i<4;i++)printf("%4d",i[a]);
getch();
}
```

Activate Windows
Go to PC settings to activate Windows.

5:42 PM
23-Sep-23

TC

File Edit Run Compile Project Options Debug Break/watch

Line 7 Col 53 Insert Indent Tab Fill Unindent * E:4PMNET.C

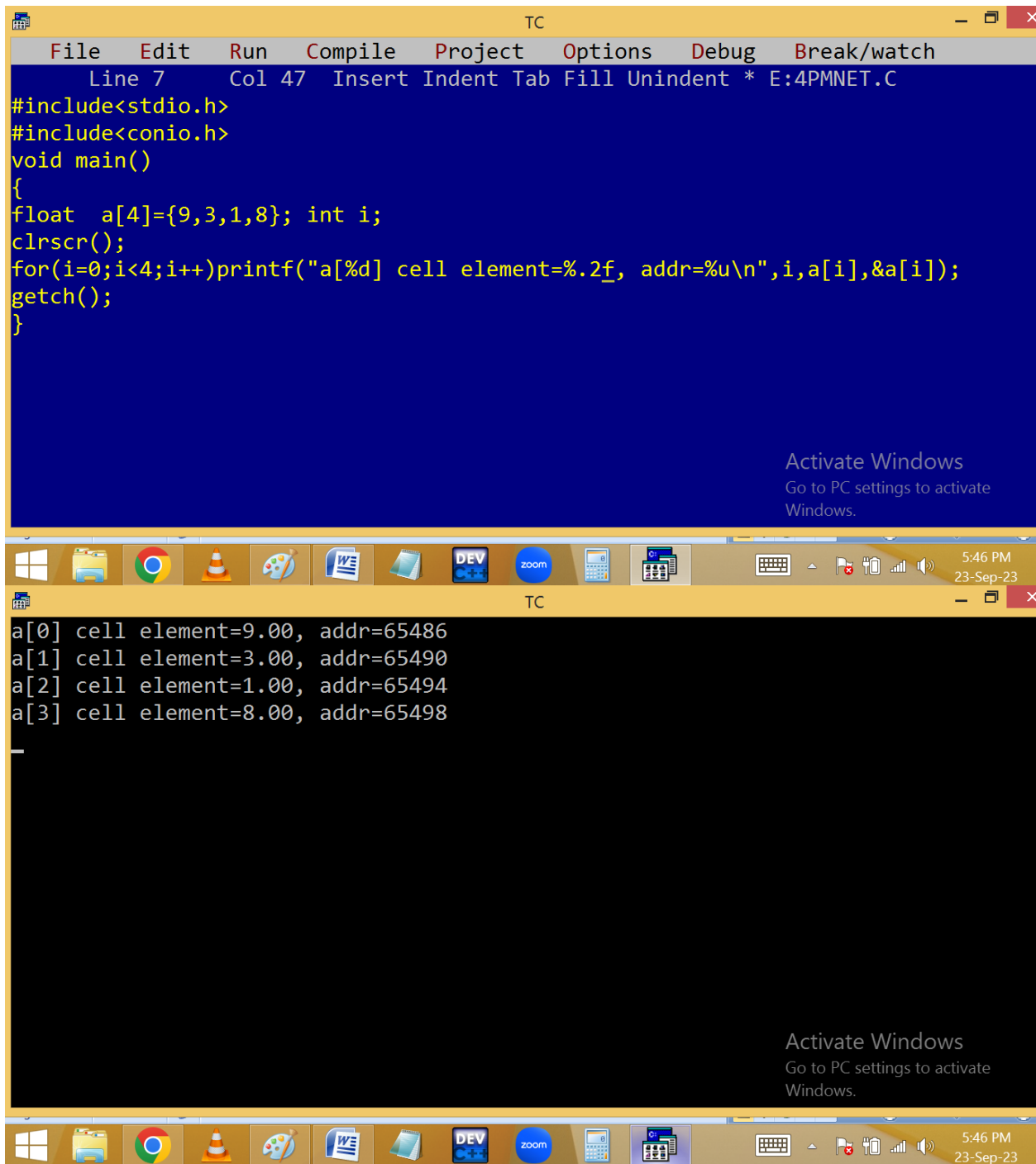
```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[4]={9,3,1,8}, i;
clrscr();
for(i=0;i<4;i++)printf("a[%d]cell element=%d, addr=%u\n",i,a[i],&a[i]);
getch();
}
```

Activate Windows
Go to PC settings to activate Windows.

TC

```
a[0]cell element=9, addr=65494
a[1]cell element=3, addr=65496
a[2]cell element=1, addr=65498
a[3]cell element=8, addr=65500
```

Activate Windows
Go to PC settings to activate Windows.



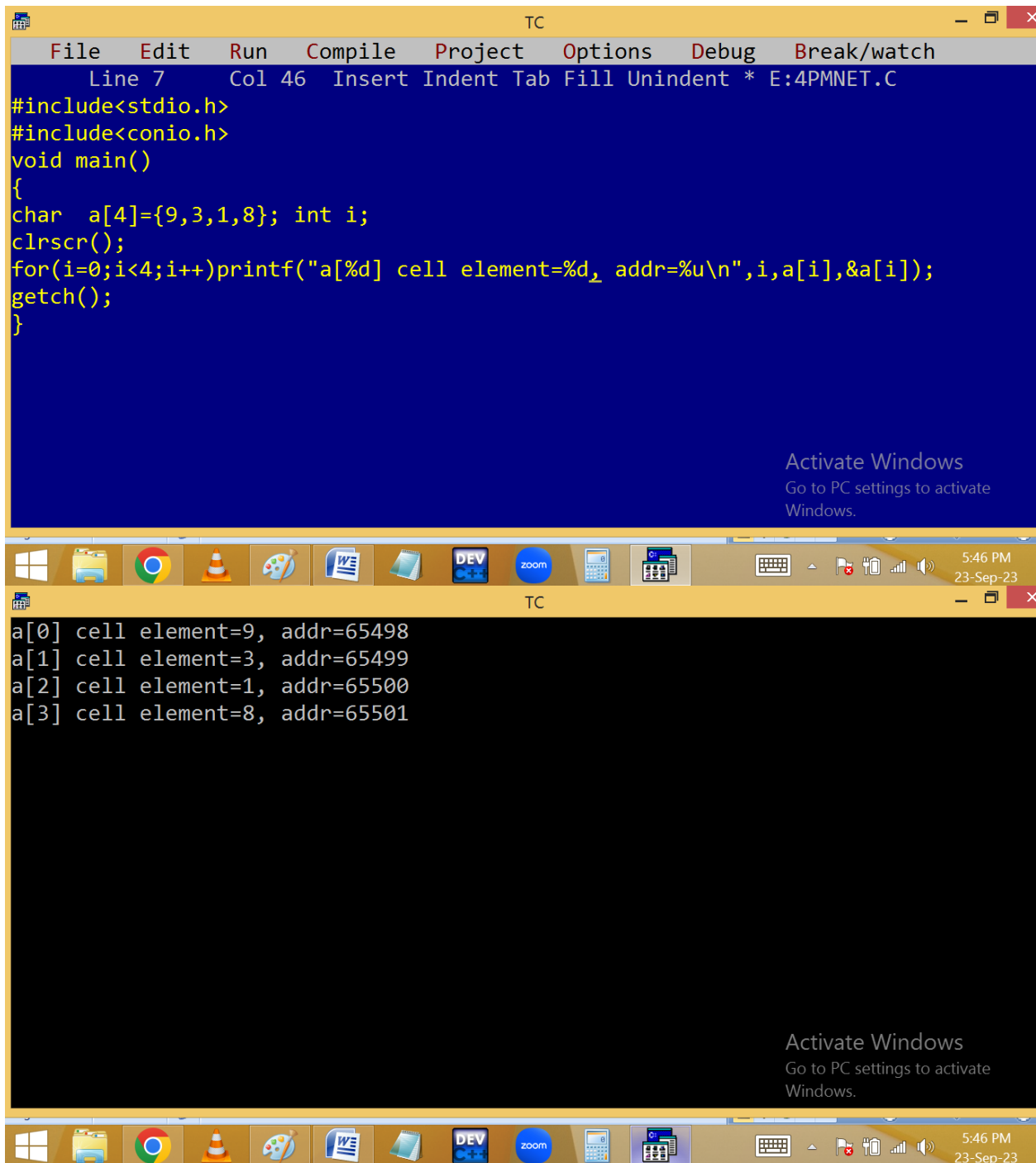
The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 47 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
float a[4]={9,3,1,8}; int i;
clrscr();
for(i=0;i<4;i++)printf("a[%d] cell element=%.2f, addr=%u\n",i,a[i],&a[i]);
getch();
}
```

The bottom window shows the output of the program:

```
a[0] cell element=9.00, addr=65486
a[1] cell element=3.00, addr=65490
a[2] cell element=1.00, addr=65494
a[3] cell element=8.00, addr=65498
_
```

Both windows include a taskbar at the bottom with various application icons and a system tray showing the time as 5:46 PM on 23-Sep-23. An "Activate Windows" watermark is visible in the bottom right corner of each window.



The image shows a screenshot of the Turbo C++ (TC) IDE. The top window displays a C program with the following code:

```
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 46 Insert Indent Tab Fill Unindent * E:4PMNET.C
#include<stdio.h>
#include<conio.h>
void main()
{
char a[4]={9,3,1,8}; int i;
clrscr();
for(i=0;i<4;i++)printf("a[%d] cell element=%d, addr=%u\n",i,a[i],&a[i]);
getch();
}
```

The bottom window shows the output of the program:

```
a[0] cell element=9, addr=65498
a[1] cell element=3, addr=65499
a[2] cell element=1, addr=65500
a[3] cell element=8, addr=65501
```

Both windows include a taskbar at the bottom with icons for Windows, File Explorer, Chrome, VLC, Paint, Word, DEV, Zoom, and a calculator. The system clock in the bottom right corner indicates 5:46 PM on 23-Sep-23. An "Activate Windows" watermark is visible in the bottom right of both windows.