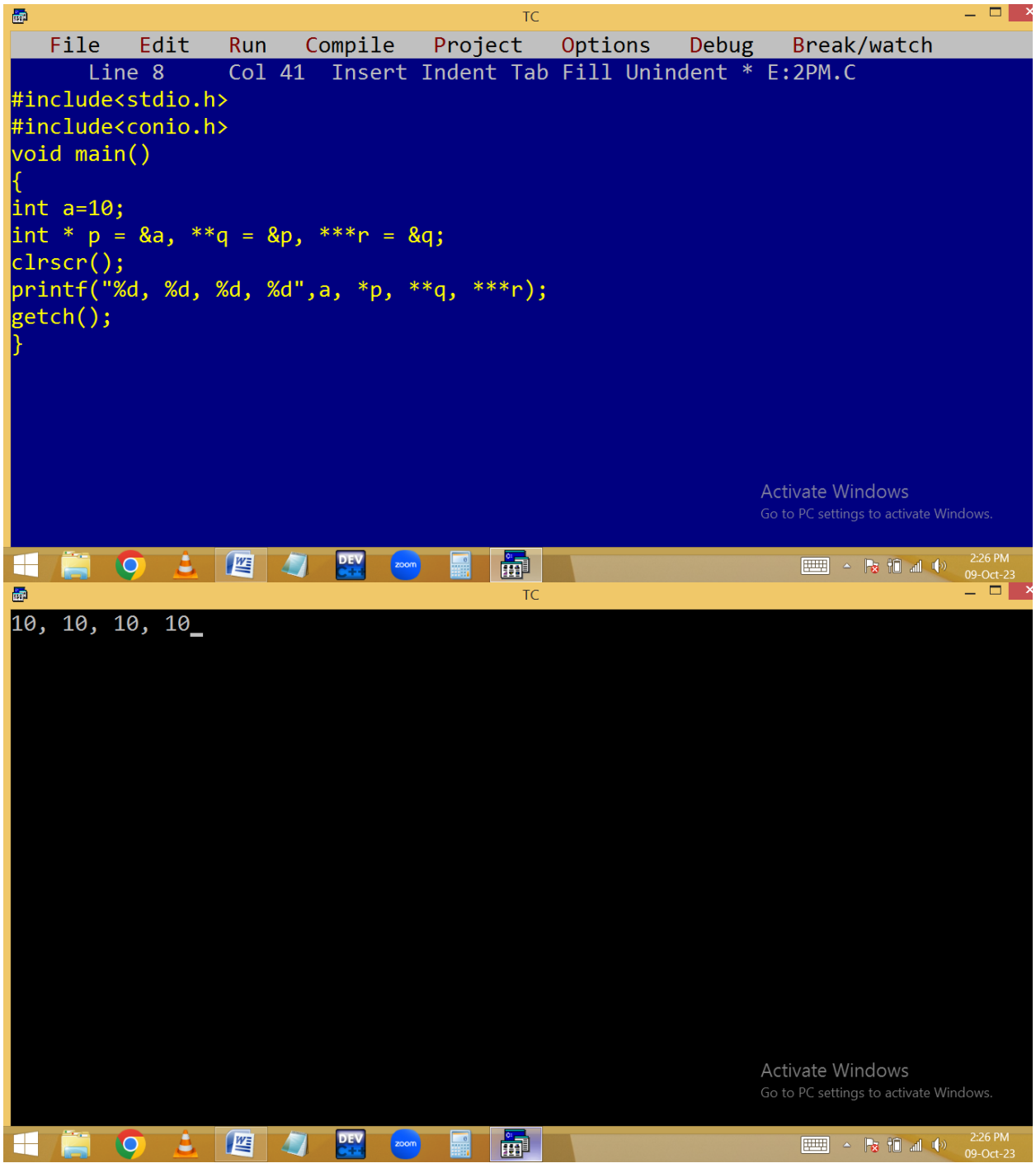
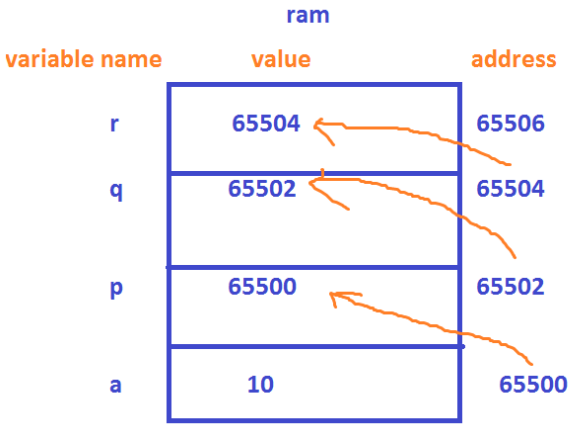
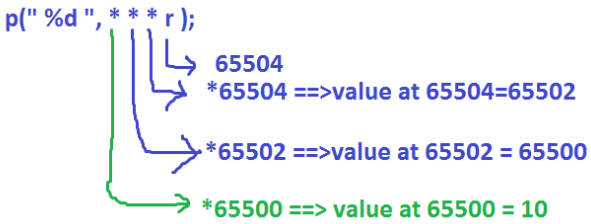
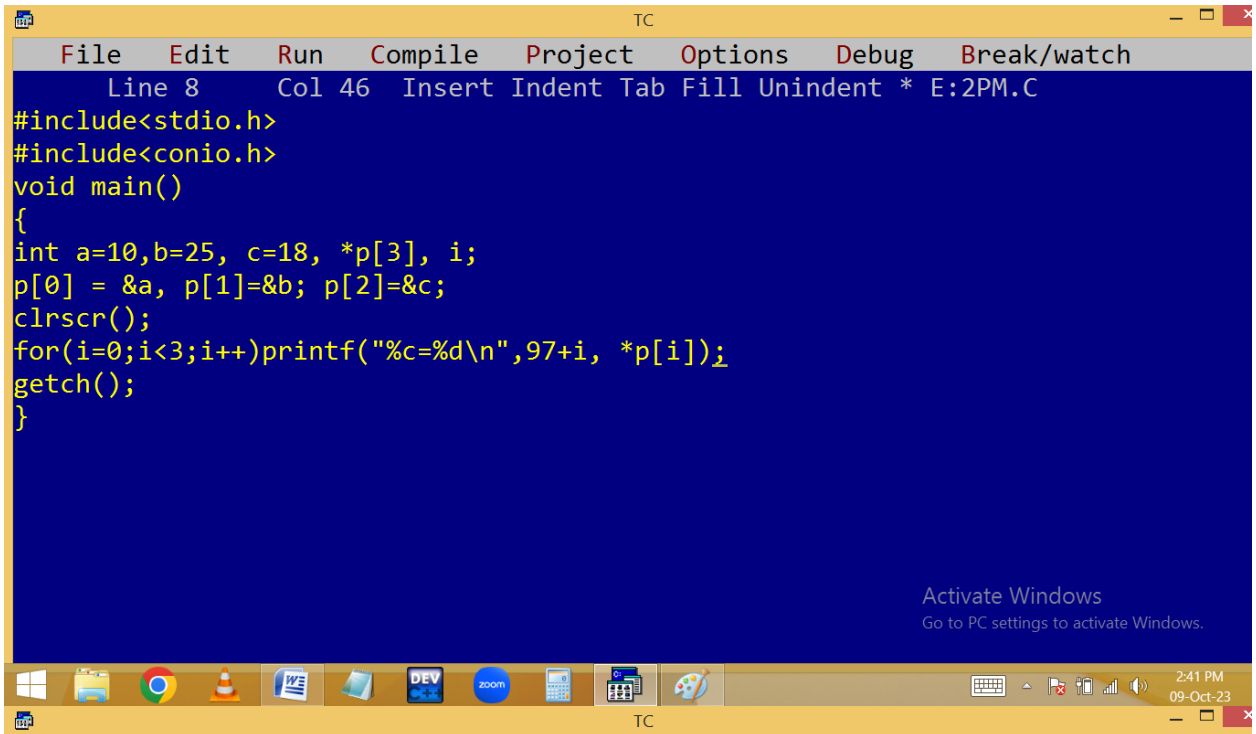
POINTER TO POINTER / DOUBLE POINTER: the pointer which stores the address of another pointer is called double pointer and it is used to manage dynamic arrays.

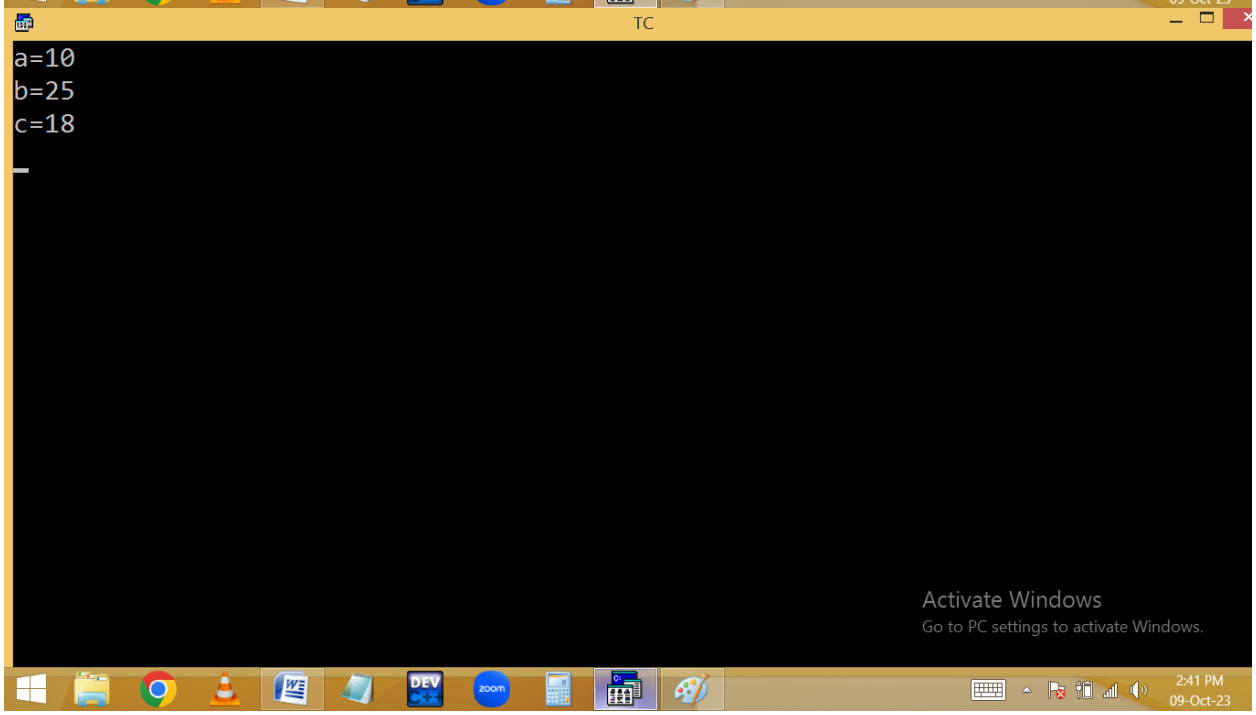

TC
File Edit Run Compile Project Options Debug Break/watch
Line 8 Col 41 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a=10;
int * p = &a, **q = &p, ***r = &q;
clrscr();
printf("%d, %d, %d, %d",a, *p, **q, ***r);
getch();
}
Activate Windows
Go to PC settings to activate Windows.
2:26 PM
09-Oct-23
TC
10, 10, 10, 10
Activate Windows
Go to PC settings to activate Windows.
2:26 PM
09-Oct-23

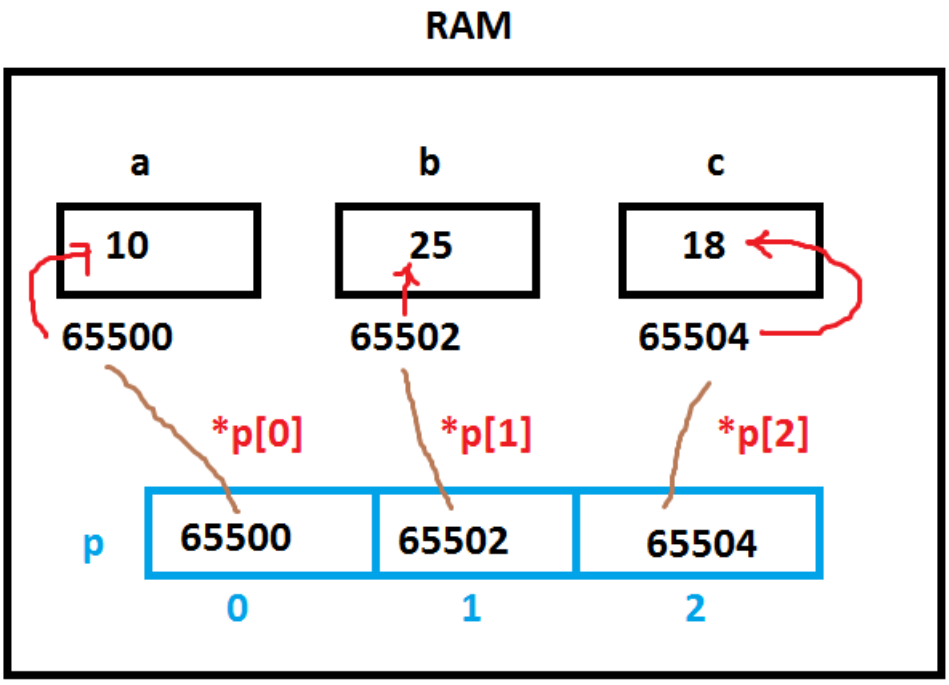




Array of pointers: Like normal variables we can declare pointer using array. Due to this one pointer is able to store several address and reduce no of declarations and program size. It is useful to handle dynamic arrays.


TC
File Edit Run Compile Project Options Debug Break/watch
Line 8 Col 46 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a=10,b=25, c=18, *p[3], i;
p[0] = &a, p[1]=&b; p[2]=&c;
clrscr();
for(i=0;i<3;i++)printf("%c=%d\n",97+i, *p[i]);
getch();
}
Activate Windows
Go to PC settings to activate Windows.
2:41 PM
09-Oct-23


TC
a=10
b=25
c=18
Activate Windows
Go to PC settings to activate Windows.
2:41 PM
09-Oct-23



Pointer to array:

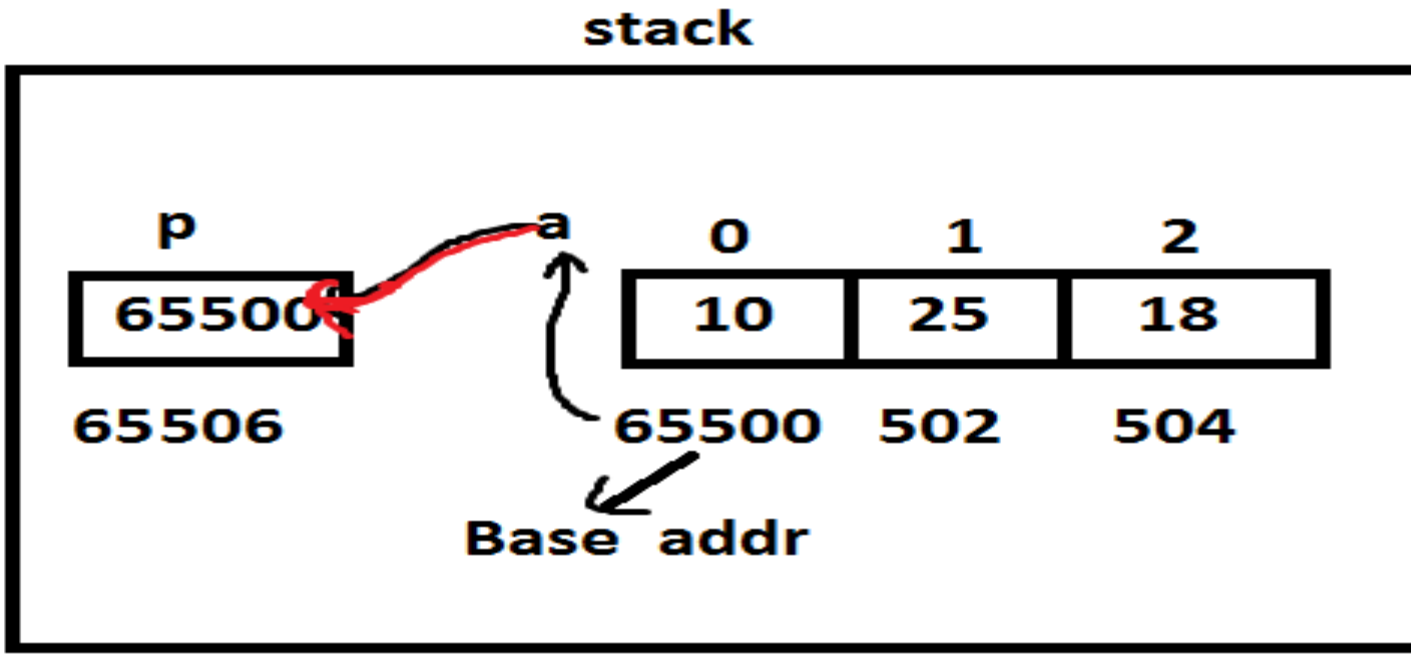
Array is implicit pointer. Due to this it holds the base cell addr [0 cell addr] implicitly. By assigning the array name or 0 cell addr to the pointer, we can handle array elements using the following syntax.

***(ptrvariable + offset/index * sizeof(variable));**

Eg:

int a[3]={10, 25, 18}, *p, i;

p = a ; or p = &a[0]; or p = &a;




```
for(i=0;i<3;i++)
printf("%4d", *(p+i));
```

Here *(p+i) meaning is:

p is 65500

1. *(p+0*2)➔*65500➔value at 65500➔**10**
2. *(p+1*2)➔*65502➔value at 65502➔**25**
3. *(p+2*2)➔*65504➔value at 65504➔**18**

Note: Here 2 is int size.

Eg:

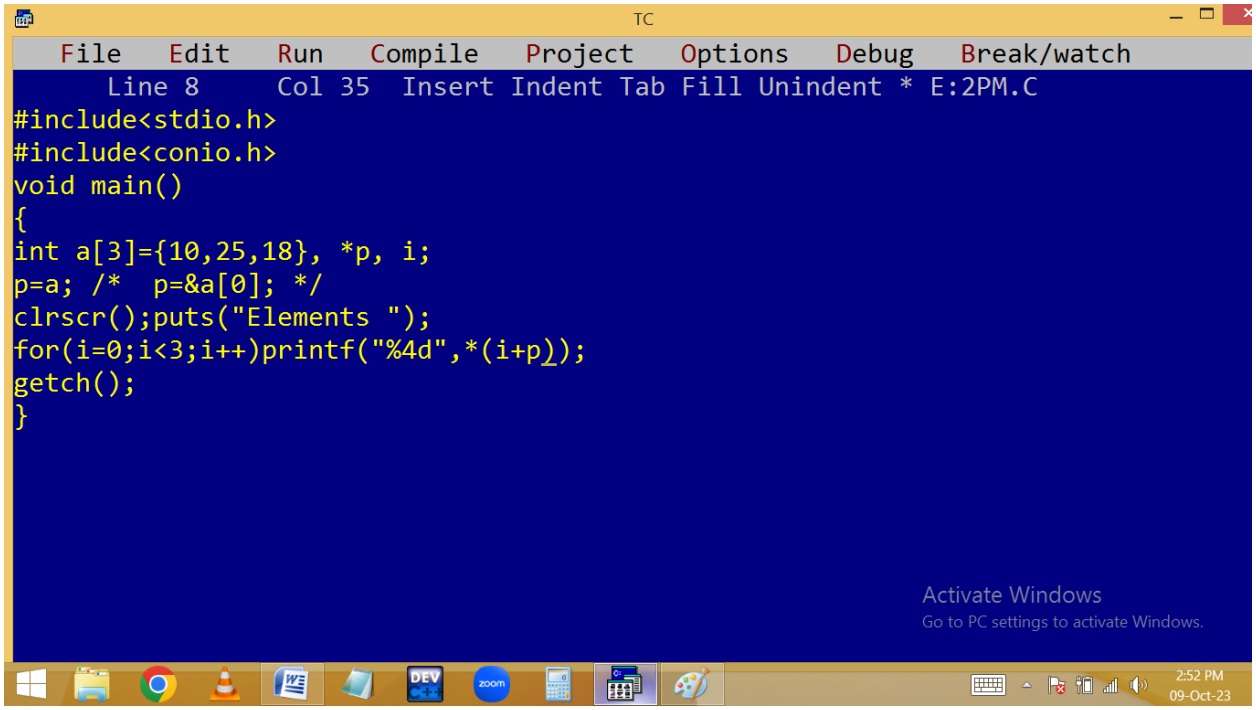
```
#include<stdio.h>
#include<conio.h>
void  main()
{
int  *p,  a[3]={10,25,18}, i;
clrscr();
p = a;   /* p=&a[0]; or p=&a; */
```

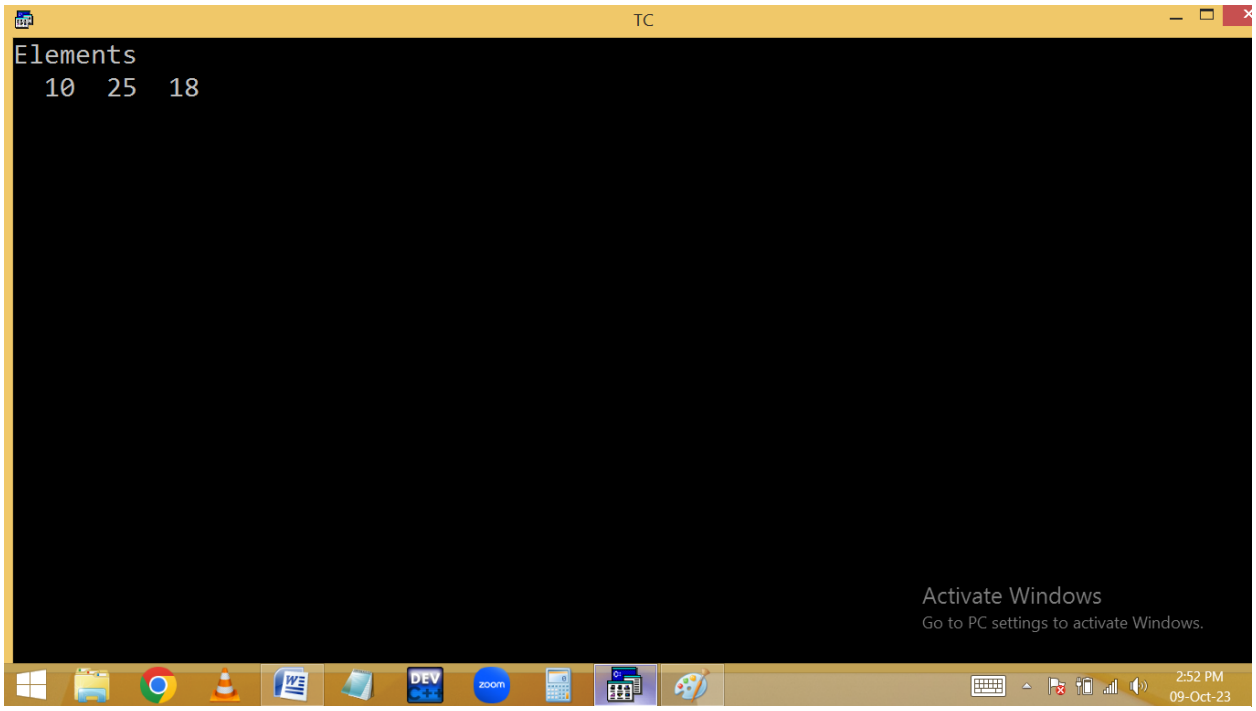
```
printf("Elements are: ");
for(i=0;i<3;i++)
printf("%4d",*(p+i));
getch();
}
```

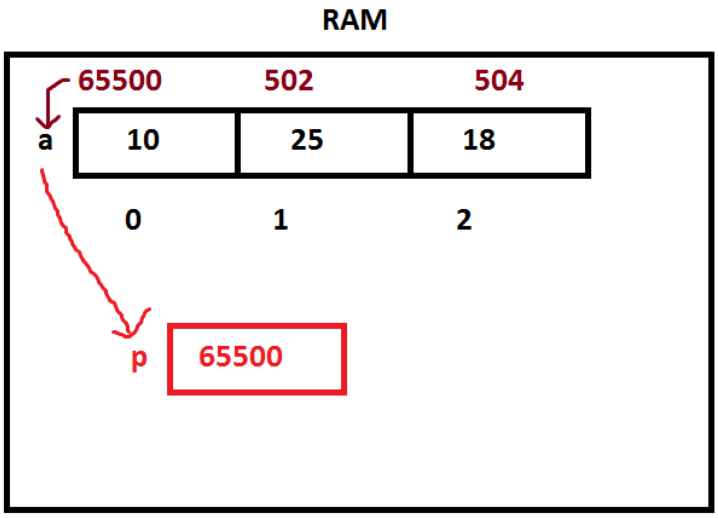
Output: Elements are: 10 25 18

Note: We can access array elements using array / pointer in following ways.

a[i] / i[a] / p[i] / i[p] / *(p+i) / *(a+i) / *(i+p) / *(i+a)





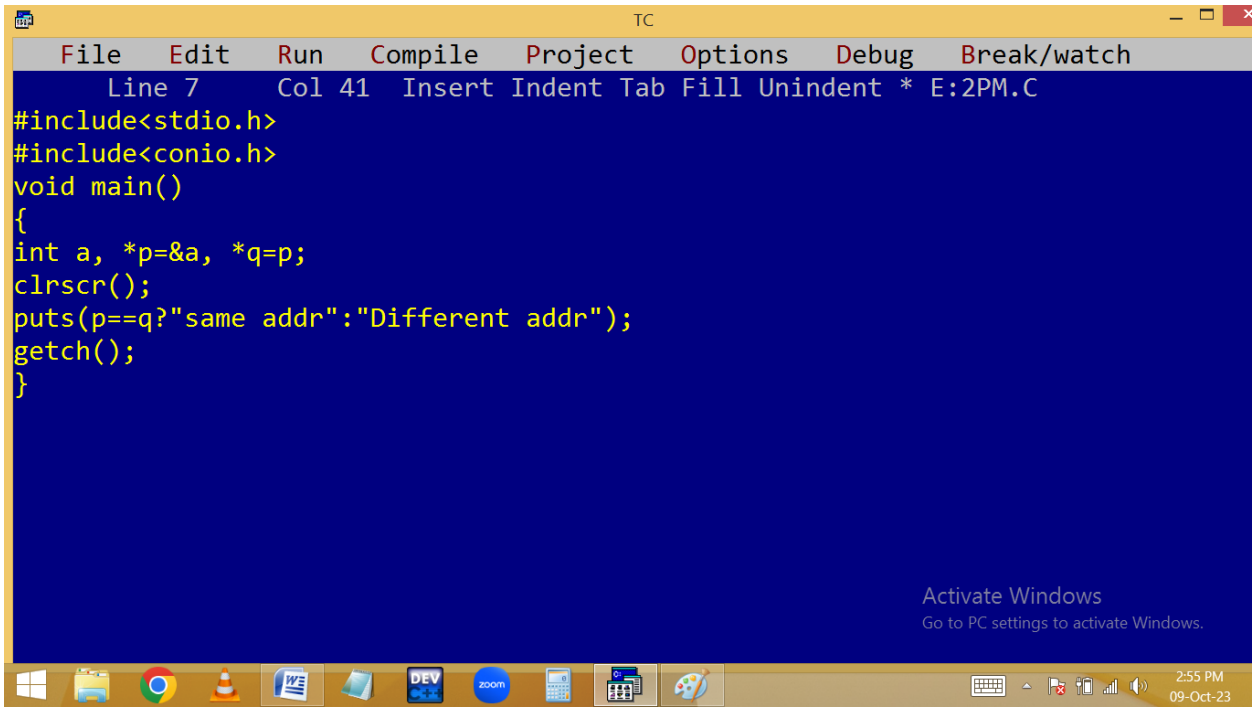


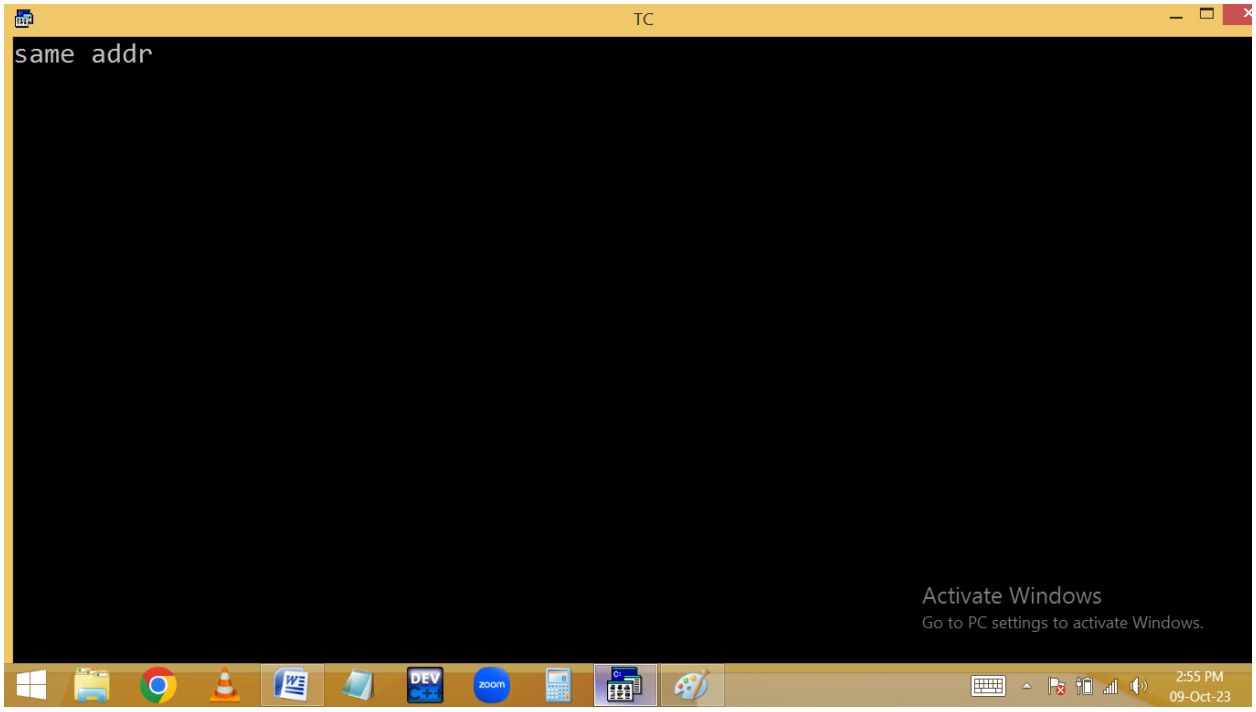

```
for(i=0;i<3;i++)
p("%4d", *(p+i));
```

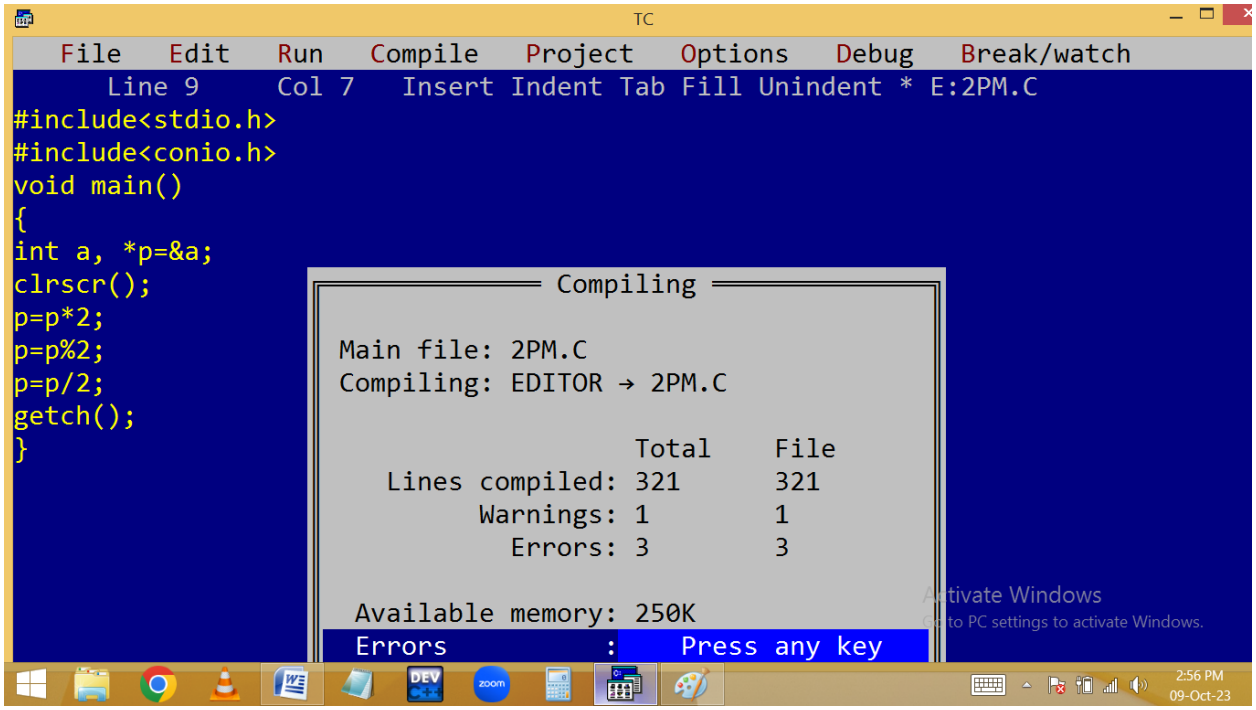
*65500+0*2=*65500=value at 65500=10
*65500+1*2=*65502=value at 65502=25
*65500+2*2=*65504=value at 65504=18

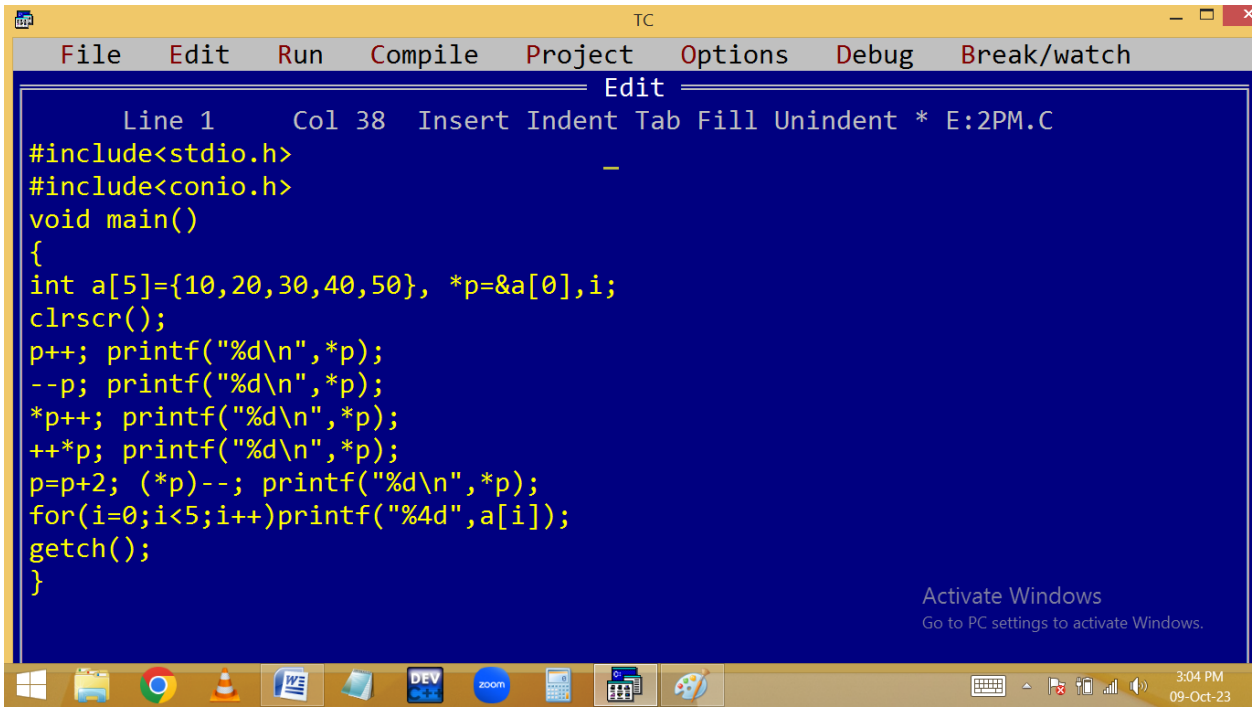
Pointer arithmetic:

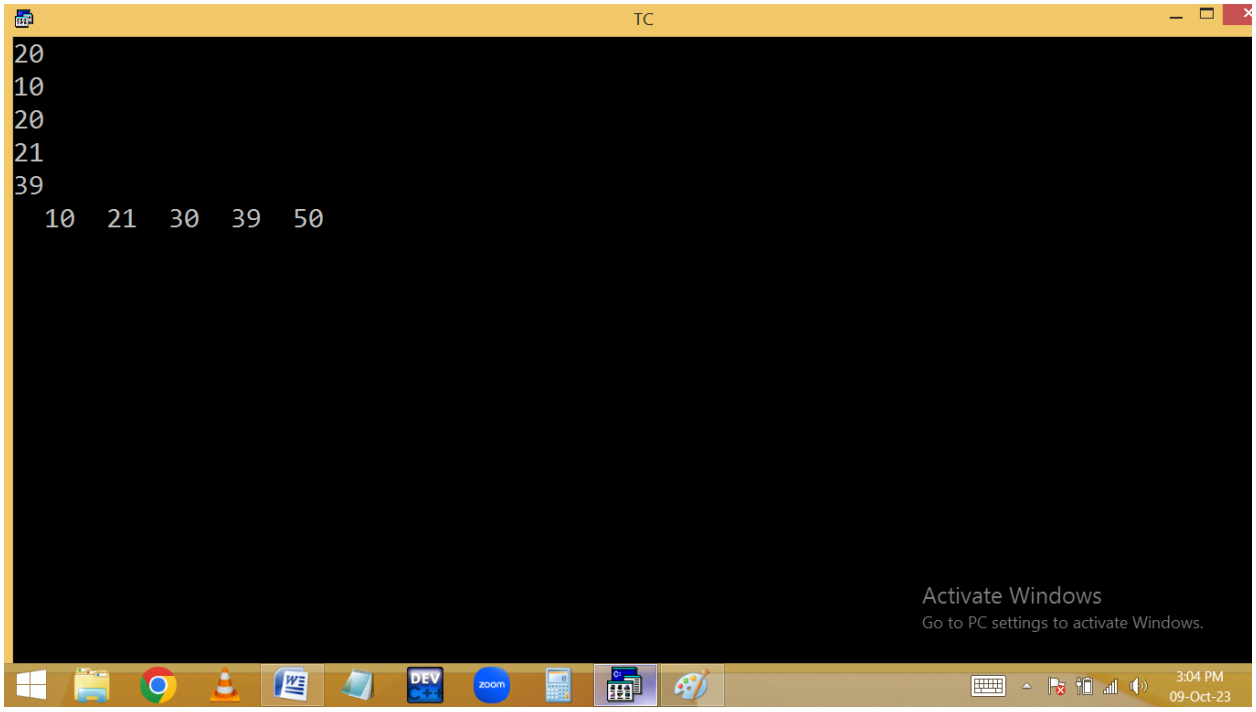
Like general variables we can do the operations like =, == , +, -, ++, -- on pointers. But we can't perform *, %, / on pointers.


TC
File Edit Run Compile Project Options Debug Break/watch
Line 7 Col 41 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a, *p=&a, *q=p;
clrscr();
puts(p==q?"same addr":"Different addr");
getch();
}
Activate Windows
Go to PC settings to activate Windows.
2:55 PM
09-Oct-23

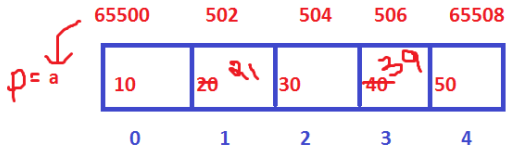

TC
same addr
Activate Windows
Go to PC settings to activate Windows.
2:55 PM
09-Oct-23


TC
File Edit Run Compile Project Options Debug Break/watch
Line 9 Col 7 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a, *p=&a;
clrscr();
p=p*2;
p=p%2;
p=p/2;
getch();
}
Compiling
Main file: 2PM.C
Compiling: EDITOR → 2PM.C
Total File
Lines compiled: 321 321
Warnings: 1 1
Errors: 3 3
Available memory: 250K
Errors : Press any key
Activate Windows
Go to PC settings to activate Windows.
2:56 PM
09-Oct-23

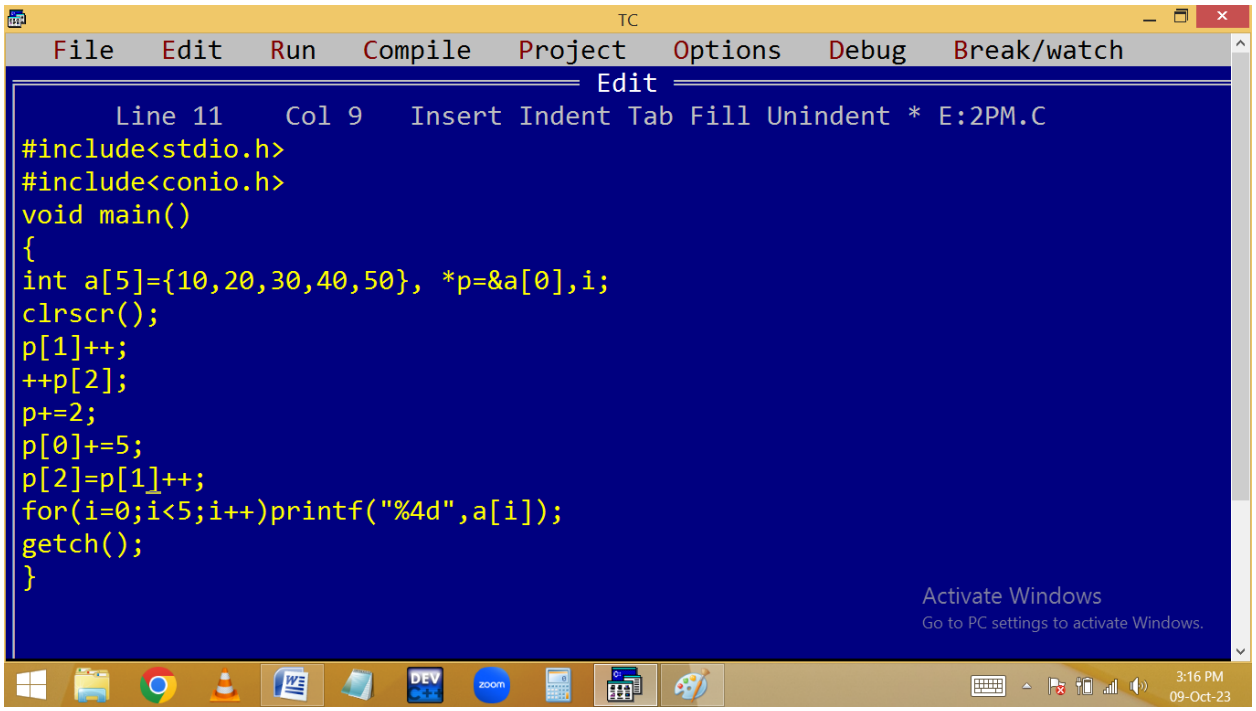

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 1 Col 38 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[5]={10,20,30,40,50}, *p=&a[0],i;
clrscr();
p++; printf("%d\n",*p);
--p; printf("%d\n",*p);
*p++; printf("%d\n",*p);
++*p; printf("%d\n",*p);
p=p+2; (*p)--; printf("%d\n",*p);
for(i=0;i<5;i++)printf("%4d",a[i]);
getch();
}
Activate Windows
Go to PC settings to activate Windows.
3:04 PM
09-Oct-23

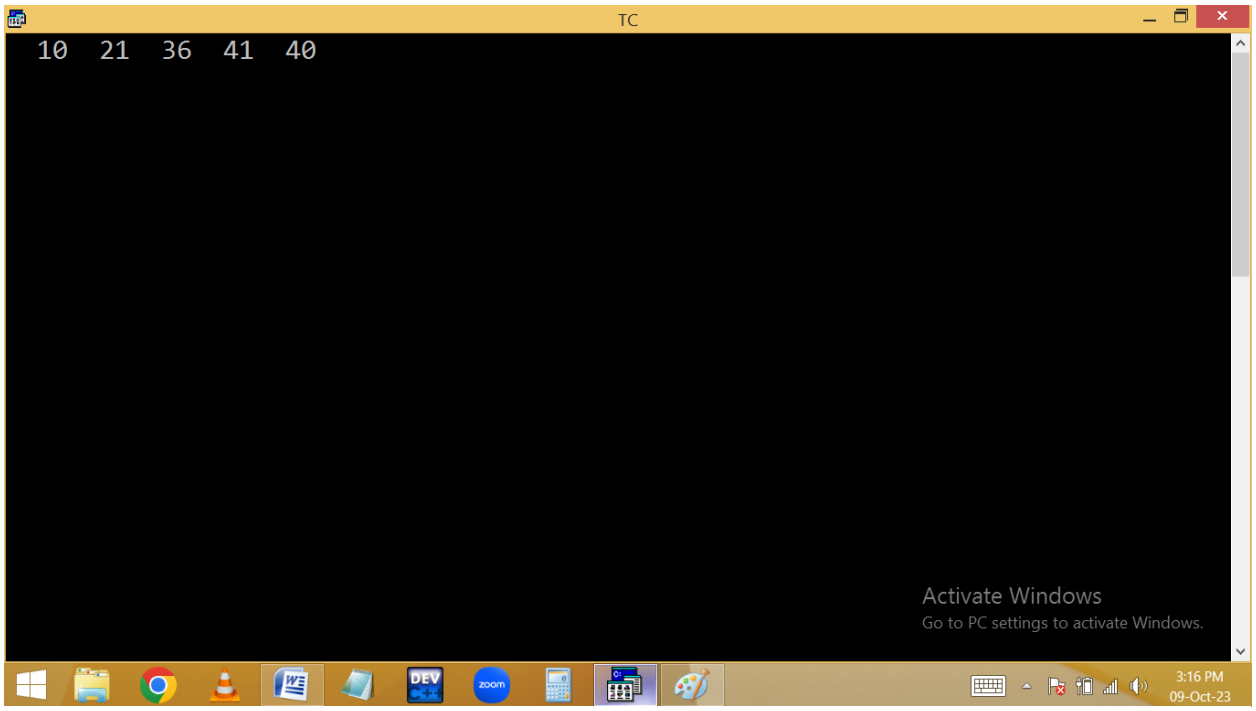

TC
20
10
20
21
39
10 21 30 39 50
Activate Windows
Go to PC settings to activate Windows.
3:04 PM
09-Oct-23

p=65500
p++==> 65500+1*2=65502
p(*p)==>value at 65502==> 20
--p; 65502-1*2=65500
p(*p)==>value at 65500==> 10
*p++ ==>p++ ==>65500+1*2=65502
p(*p)==>value at 65502 ==> 20
++*p ==> ++ of value at *p==>value at 65502
++ ==> 20++ ==> 21
p(*p)==>value at 65502 ==> 21
p=p+2==>65502+2*2=65506
(*p)-- ==> value at 65506-- ==> 40-- ==> 39



p(*p)==> value at 65506 ==> 39





p=65500

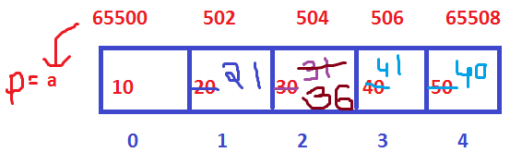
p[1]++ ==> value at 65502++ ==> 21

++p[2] ==> ++ of value at 65504 ==>++30 ==> 31

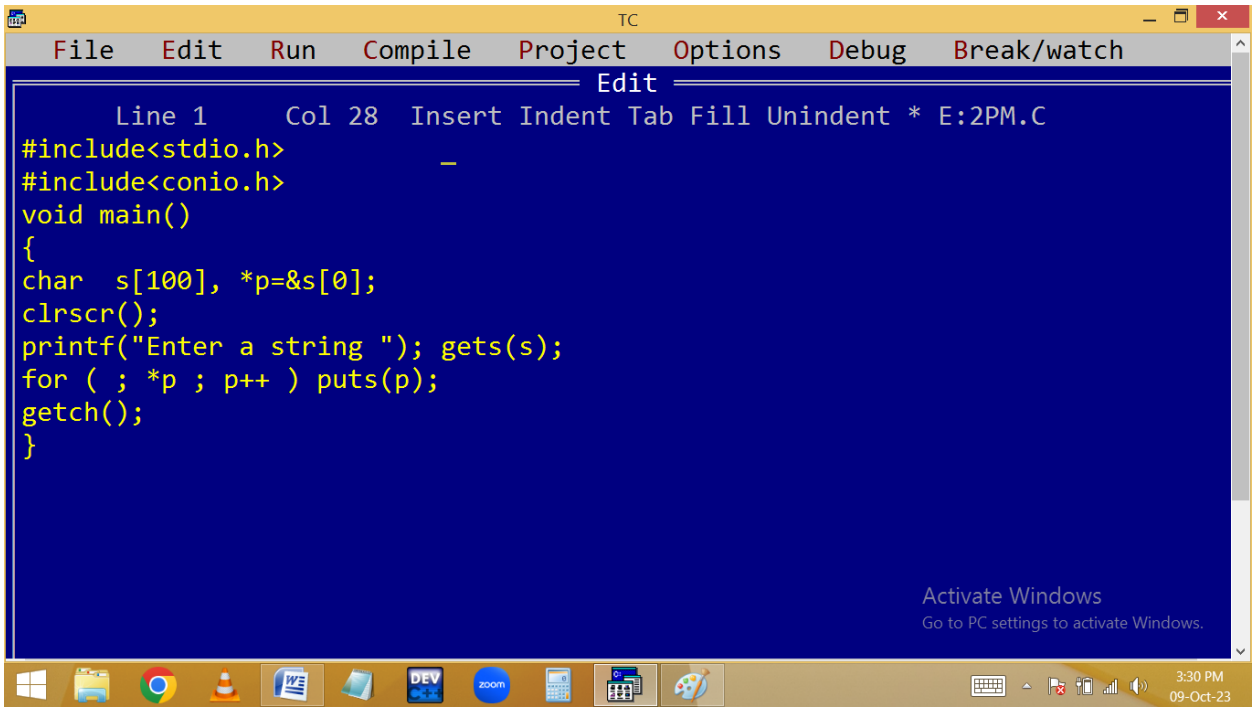
p+=2 ==>p = 65500+2*2=65504

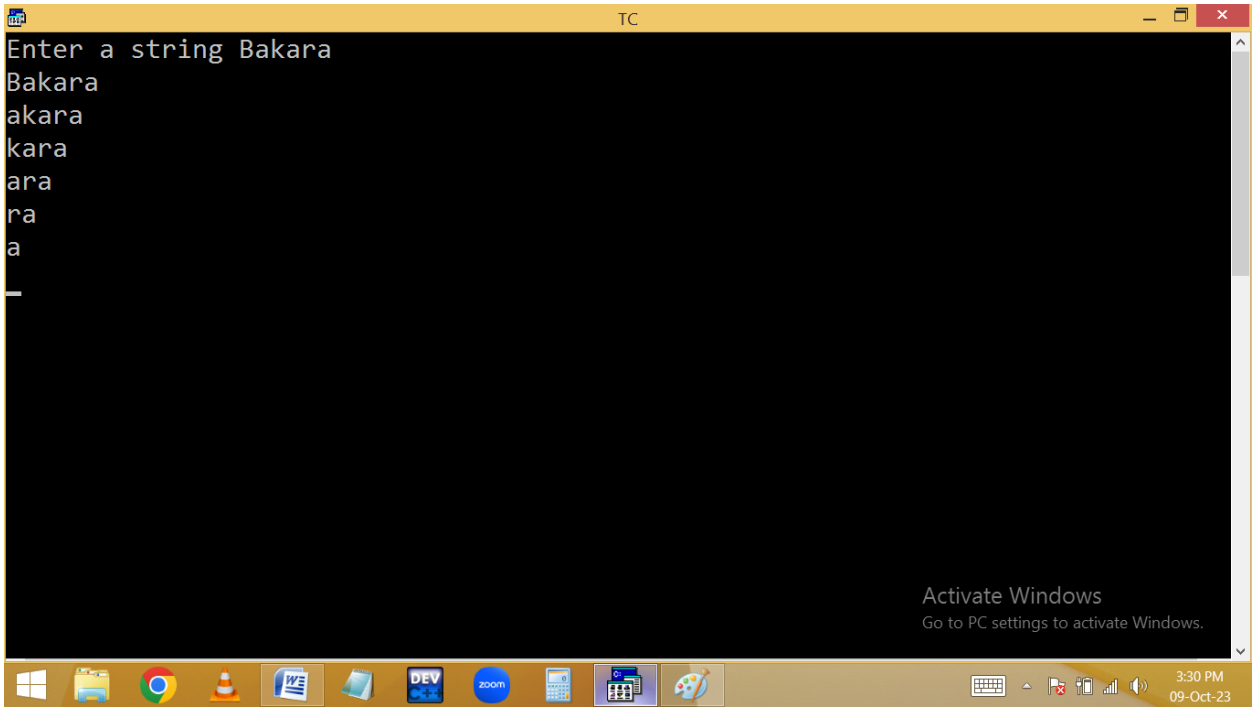
p[0]+=5 ==> p[0]=p[0]+5 ==> value at 65504 + 5 ==> 31+5 = 36

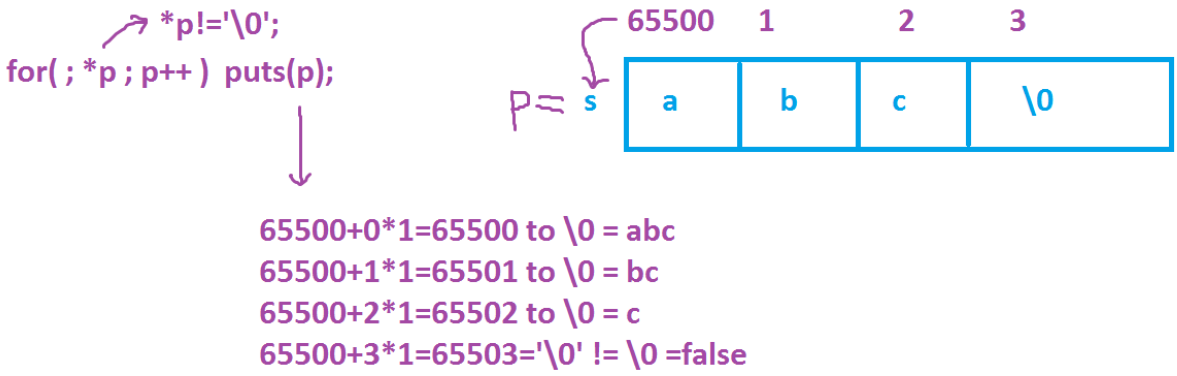
p[2]=p[1]++; p[2]=p[1] i.e. 65508=65506 ==> 50=40
p[1]++ ==> 65506++ ==> 40++ ==> 41



Pointer to string:

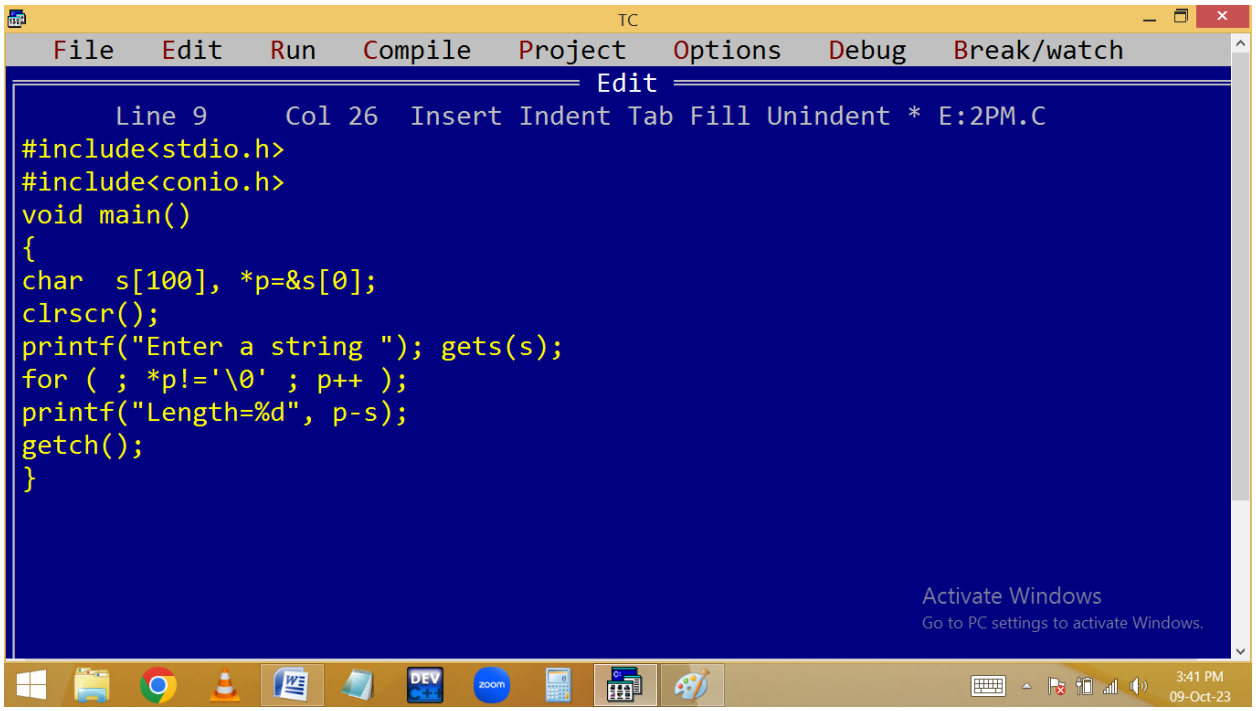

TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 1 Col 28 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
char s[100], *p=&s[0];
clrscr();
printf("Enter a string "); gets(s);
for (; *p ; p++) puts(p);
getch();
}
Activate Windows
Go to PC settings to activate Windows.
3:30 PM
09-Oct-23

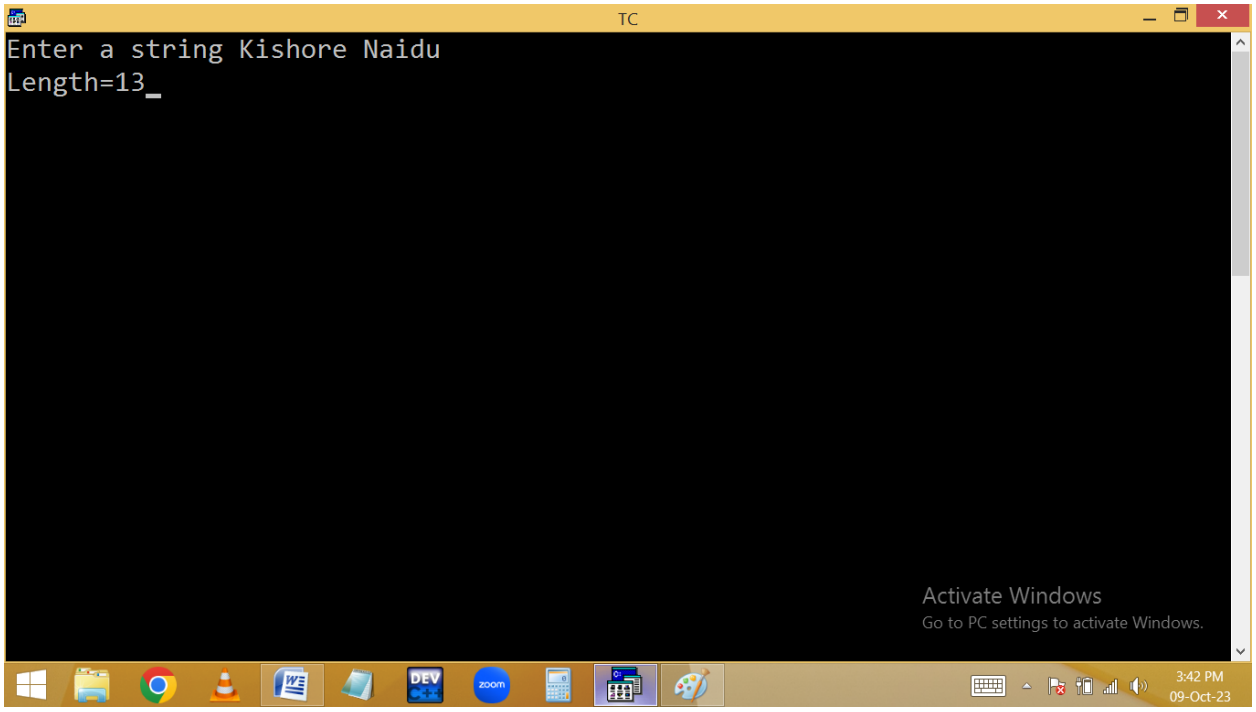

TC
Enter a string Bakara
Bakara
akara
kara
ara
ra
a
Activate Windows
Go to PC settings to activate Windows.
3:30 PM
09-Oct-23

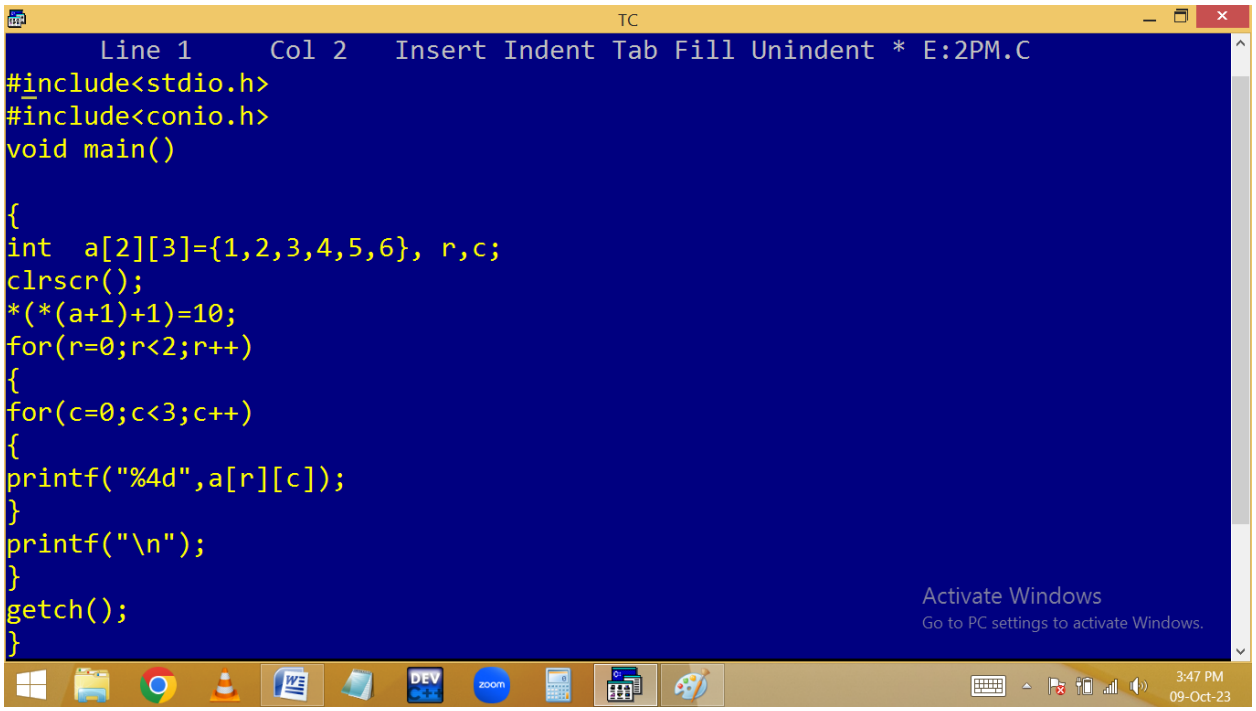


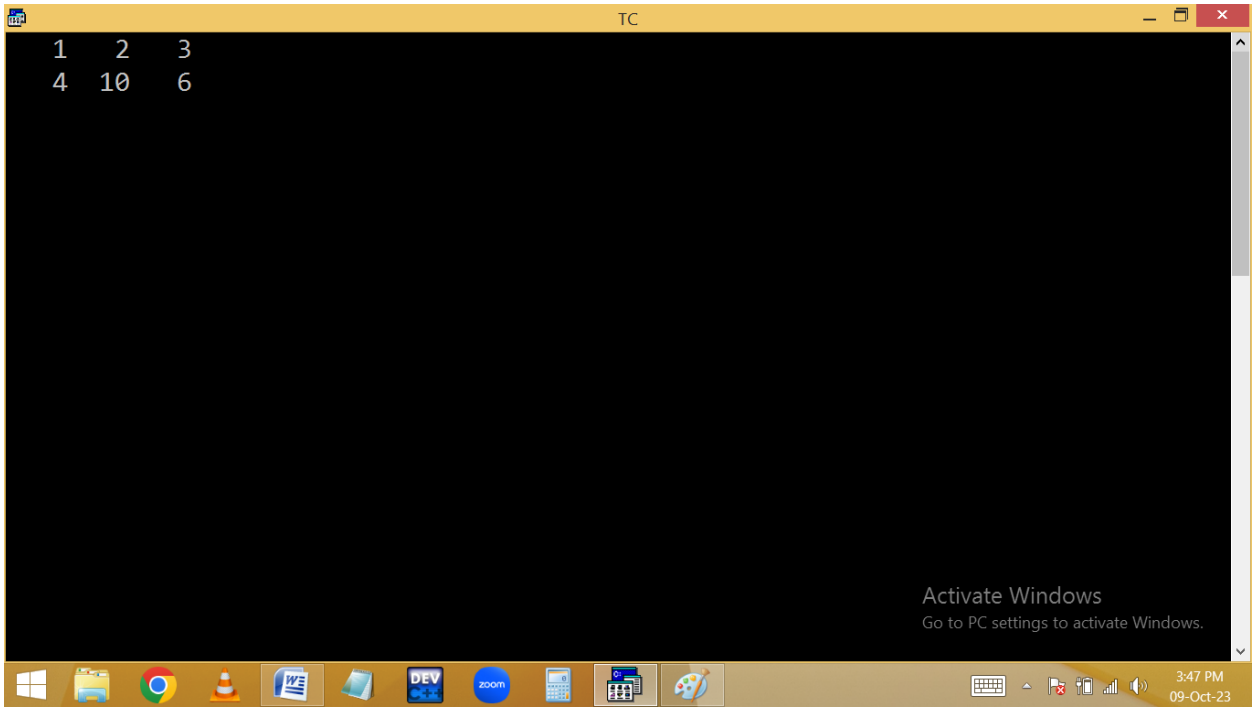
65500+0*1=65500 to \0 = abc
65500+1*1=65501 to \0 = bc
65500+2*1=65502 to \0 = c
65500+3*1=65503='\0' != \0 =false

Finding string length using pointers.


TC
File Edit Run Compile Project Options Debug Break/watch
Edit
Line 9 Col 26 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
char s[100], *p=&s[0];
clrscr();
printf("Enter a string "); gets(s);
for (; *p!='\0' ; p++);
printf("Length=%d", p-s);
getch();
}
Activate Windows
Go to PC settings to activate Windows.
3:41 PM
09-Oct-23


TC
Enter a string Kishore Naidu
Length=13
Activate Windows
Go to PC settings to activate Windows.
3:42 PM
09-Oct-23


TC
Line 1 Col 2 Insert Indent Tab Fill Unindent * E:2PM.C
#include<stdio.h>
#include<conio.h>
void main()
{
int a[2][3]={1,2,3,4,5,6}, r,c;
clrscr();
((a+1)+1)=10;
for(r=0;r<2;r++)
{
for(c=0;c<3;c++)
{
printf("%4d",a[r][c]);
}
printf("\n");
}
getch();
}
Activate Windows
Go to PC settings to activate Windows.
3:47 PM
09-Oct-23


TC
1 2 3
4 10 6
Activate Windows
Go to PC settings to activate Windows.
3:47 PM
09-Oct-23