```c
/*
3. Design, Develop and Implement a menu driven Program in C for the following
   operations on STACK of Integers
  (Array Implementation of Stack with maximum size MAX)
  a. Push an Element on to Stack
  b. Pop an Element from Stack
  c. Demonstrate how Stack can be used to check Palindrome
  d. Demonstrate Overflow and Underflow situations on Stack
  e. Display the status of Stack
  f. Exit
Support the program with appropriate functions for each of the above operations
*/

/*
The program has to do 4 functions. So we are going to write 4 functions.
*/


#define MAX 5
int stack[5];
int top=-1;                          //Indicates initially stack is empty

void main()
{
    int ch;
    while(1)
        {
            printf("\n STACK OPERATIONS \n");
            printf("\n 1.Push\n 2.Pop\n 3.Display\n 4.Palindrome\n 5.Exit\n");

            printf("Enter your choice\n");
            scanf("%d",&ch);

            switch(ch)
            {
                case 1:push();
                       break;

                case 2:pop();
                       break;

                case 3:display();
                       break;

                case 4:palindrome();
                       break;

                case 5:return;
                default: printf("Invalid choice\n");
            }
        }
} //end of main function


//Push an Element on to Stack
void push()
{
    int item;

    if(top==(MAX-1))                          // Stack Overflow situations
        printf("Stack Overflow\n");
    else
        {
            printf("Enter the element to be pushed :");
            scanf("%d",&item);

```

```
            stack[++top]=item;          // pushing element to the top of stack
        }
}

/*
Pop an Element from Stack. Element is poped from the top of stack.
The last element entered is popped out. (LIFO)
*/

void pop()
{
    if(top==-1)
        printf("Stack Underflow\n");
    else
        printf("The poped element is %d\n",stack[top--]);
}

/*
Display the status of Stack.
When displaying, we start from the last element and keep decrementing till Zero.
*/
void display()
{
    int i;

    if(top==-1)
        printf("Stack Empty\n");
        else
            {
                printf("The elements of the stack are:\n");
                for(i=top;i>=0;i--)
                    printf("%d\n",stack[i]);
            }
}

//To show how Stack can be used to check Palindrome.

void palindrome()
{
    int i;
    int count=0;

    for(i=0; i<=(top/2); i++)
        {
            if(stack[i] == stack[top-i])
            count++;
        }

        if((top/2 +1) == count)
            printf("Stack contents are Palindrome\n");
        else
            printf("Stack contents are not palindrome\n");
}

```

OUTPUT:

```
 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
Stack Underflow

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
3
Stack Empty

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :10

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :20

 STACK OPERATIONS

 1.Push
 2.Pop
```

```
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :30

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :40

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :50

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Stack Overflow

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
3
The elements of the stack are:
```

```
50
40
30
20
10

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
The poped element is 50

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
The poped element is 40

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
The poped element is 30

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
The poped element is 20
```

```
 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
The poped element is 10

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
Stack Underflow

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
3
Stack Empty

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :1

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
```

```
 5.Exit
Enter your choice
1
Enter the element to be pushed :2

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :3

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :2

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
1
Enter the element to be pushed :1

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
3
The elements of the stack are:
1
2
```

```
3
2
1

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
4
Stack contents are Palindrome

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
2
The poped element is 1

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
4
Stack contents are not palindrome

 STACK OPERATIONS

 1.Push
 2.Pop
 3.Display
 4.Palindrome
 5.Exit
Enter your choice
5

Process returned 4199352 (0x4013B8)   execution time : 647.215 s
Press any key to continue.
```