1)Write a program to simulate the working of stack using an array with the following: a) Push b) Pop c) Display The program should print appropriate messages for stack overflow, stack underflow

```c
#include<stdio.h>
#include<stdlib.h>
#define MAX 5
int a[MAX];
int top=-1;
void push()
{
    if(top== MAX-1)
    {
        printf("\n Stack overflow ");
    }
    else
    {
        int ele ;
        printf("\n Enter the element to be pushed:");
        scanf("%d",&ele);
        top+=1;
        a[top]=ele;
        printf("The element %d is pushed into the stack\n",ele);
    }
}
void pop()
{
    int el;
    if(top==-1)
        printf("\nThe stack is empty");
    else
    {
        el=a[top];
        top=top-1;
        printf("\nThe element %d is popped from the stack ",el);
    }
}
void display()
{
    int i;
    if(top==-1)
        printf("The stack is empty");
    else
    {
        printf("\n The elements of stack are:");
        for(i=top;i>=0;i--)
        {
            printf("\n %d \n",a[i]);
        }
    }
}
```

```c
int main()
{
    int choice;
    while(1)
    {
        printf("\n1.PUSH");
        printf("\n2.POP");
        printf("\n3.DISPLAY");
        printf("\n4.EXIT\n");
        printf("Enter the choice :");
        scanf("%d",&choice);
        switch(choice)
        {
            case 1:
                push();
                break;
            case 2:
                pop();
                break;
            case 3:
                display();
                break;
            case 4:
                return 0;
            default:
                printf("Invalid choice try again");
        }
    }
    return 0;
}
```

OUTPUT:

```
1.PUSH
2.POP
3.DISPLAY
4.EXIT
Enter the choice :1

 Enter the element to be pushed:10
The element 10 is pushed into the stack

1.PUSH
2.POP
3.DISPLAY
4.EXIT
Enter the choice :1

 Enter the element to be pushed:20
The element 20 is pushed into the stack

1.PUSH
2.POP
3.DISPLAY
4.EXIT
Enter the choice :1

 Enter the element to be pushed:30
The element 30 is pushed into the stack
```

```
1.PUSH
2.POP
3.DISPLAY
4.EXIT
Enter the choice :3

 The elements of stack are:
 30

 20

 10

1.PUSH
2.POP
3.DISPLAY
4.EXIT
Enter the choice :2

The element 30 is popped from the stack
1.PUSH
2.POP
3.DISPLAY
4.EXIT
Enter the choice :3

 The elements of stack are:
 20

 10
```

```
1.PUSH
2.POP
3.DISPLAY
4.EXIT
Enter the choice :4

Process returned 0 (0x0)   execution time : 23.090 s
Press any key to continue.
```