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Section – 620-B

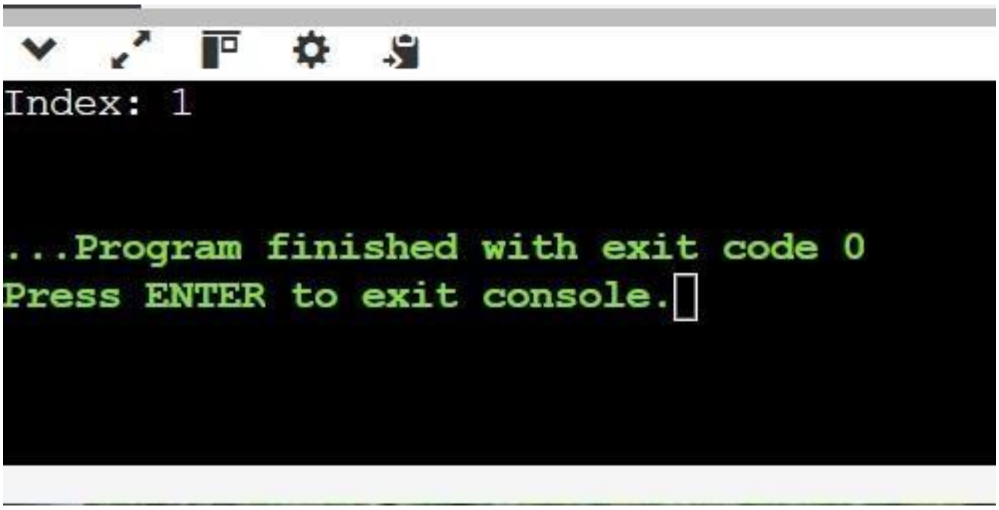
Domain Winter Winning Camp

Q1. Given a string find the first non repeating character and return their index value if it does not exist than return -1.

Ans

```
#include <iostream>

#include <string> #include <vector> using namespace

std; int firstNonRepeatingCharacter(const string& s) {

vector<int> charCount(256, 0);

    for (char c : s) {

charCount[c]++;

    }

    for (int i = 0; i < s.length(); ++i) {

if (charCount[s[i]] == 1) {

            return i;

        }

    }

    return -1;

}

int main() {     string s = "Hello";     int index = firstNonRepeatingCharacter(s);     cout <<

"Index: " << (index != -1 ? to_string(index) : "No non-repeating character") << endl;

    return 0;

}
```

Output

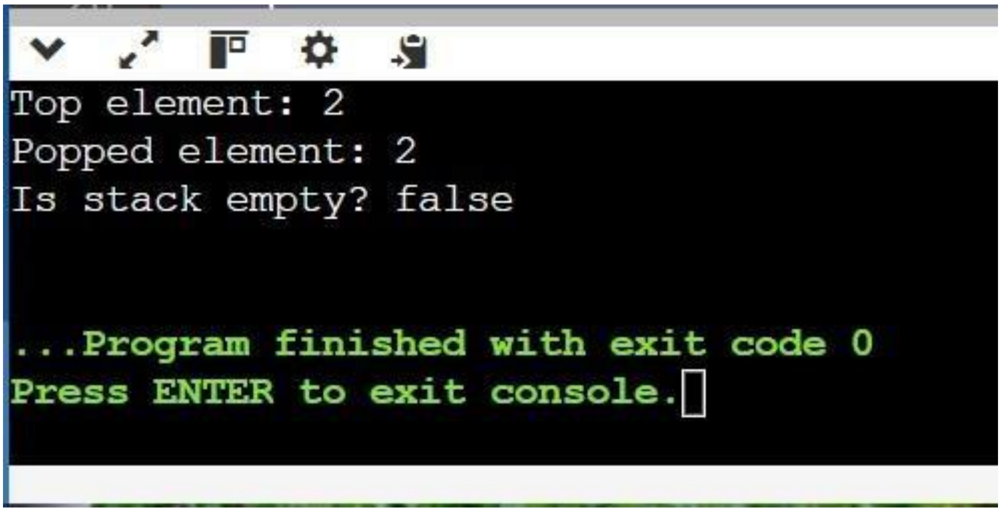


```
Index: 1


...Program finished with exit code 0
Press ENTER to exit console.
```

Q2.Implementation of 2 queue

Ans

```
#include <iostream>
#include <queue> using
namespace std; class
StackUsingQueues { private:
   queue<int> queue1, queue2;

public:
   void push(int x) {        queue1.push(x);
   }

   int pop() {
       while (queue1.size() > 1) {
queue2.push(queue1.front());
queue1.pop();
       }
       int popped_element = queue1.front();
queue1.pop();        swap(queue1, queue2);
return popped_element;
    }

    int top() {
        return queue1.back();
    }

    bool empty() {        return
queue1.empty();
    }
};

int main() {
    StackUsingQueues stack;     stack.push(1);
stack.push(2);
    cout << "Top element: " << stack.top() << std::endl;
cout << "Popped element: " << stack.pop() << std::endl;
    cout << "Is stack empty? " << std::boolalpha << stack.empty() << std::endl;
//false     return
0; }  Output
```



```
Top element: 2
Popped element: 2
Is stack empty? false


...Program finished with exit code 0
Press ENTER to exit console.
```

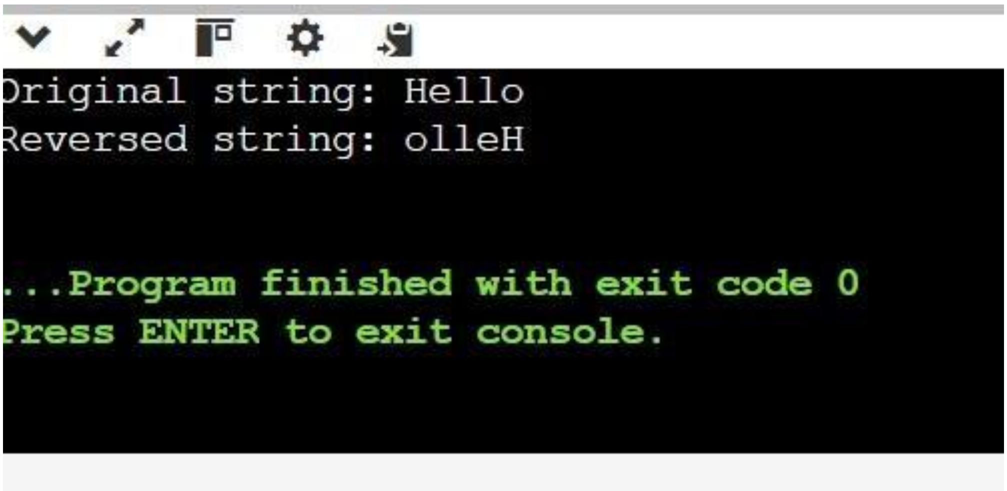
Q3. Reversal of a string

Ans

```
#include <iostream>

#include <stack> #include <string> using namespace

std; string reverseStringUsingStack(const string& input)

{     stack<char> charStack;

    for (char ch : input) {

charStack.push(ch);

    }


    string reversed;     while

(!charStack.empty()) {        reversed

+= charStack.top();

charStack.pop();

    }

    return reversed;

}

int main() {     string input = "Hello";     string

reversed = reverseStringUsingStack(input);
```

```
    cout << "Original string: " << input << endl;     cout
<< "Reversed string: " << reversed <<endl;


    return 0;
}
```

Output



```
Original string: Hello
Reversed string: olleH


...Program finished with exit code 0
Press ENTER to exit console.
```

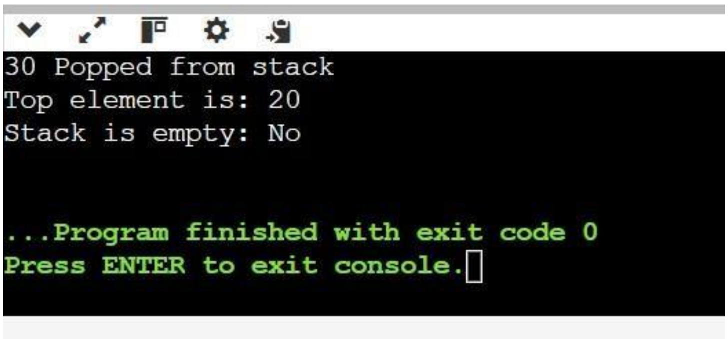
Q4. Implementation of stack using array and linked list

Ans

```
#include <iostream> using namespace
std;


class Stack {
private:     int top;
int
arr[1000];  public:
    Stack() { top = -1; }


    void push(int x) {         if (top >= 999) {
cout << "Stack Overflow" << endl;
            return;
```

```
        }
        arr[++top] = x;
    }

    int pop() {        if (top < 0) {            cout
<< "Stack Underflow" << endl;
            return -1;
        }
        return arr[top--];
    }

    int peek() {        if (top < 0) {
cout << "Stack is Empty" << endl;
            return -1;
        }
        return arr[top];
    }

    bool isEmpty() {
return (top < 0);
    }
};

int main() {
    Stack s;
    s.push(10);
    s.push(20);
    s.push(30);     cout << s.pop() << " Popped from stack\n";      cout
<< "Top element is: " << s.peek() << endl;      cout << "Stack is empty:
" << (s.isEmpty() ? "Yes" : "No") << endl;
    return 0;
}
```

Output



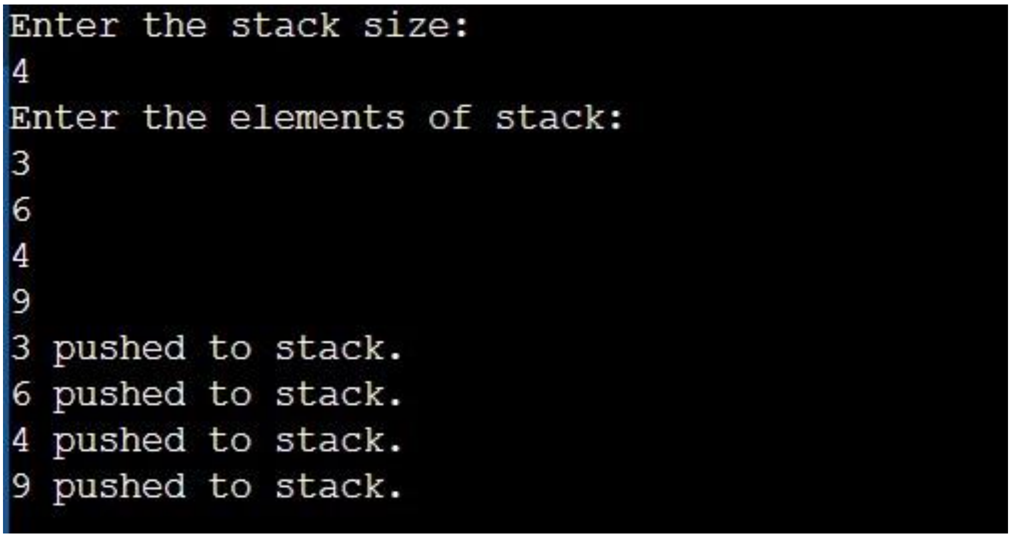
```
30 Popped from stack
Top element is: 20
Stack is empty: No


...Program finished with exit code 0
Press ENTER to exit console.
```

Q5. Implementation of stack by using array only push operation

Ans

```
#include <iostream> using namespace
std;
class Stack { private:
    int* arr;
int capacity;
    int top;
public:
    Stack(int size) {        capacity
= size;        arr =
new int[capacity];
        top = -1;
    }
    void push(int value) {        if
(top >= capacity - 1) {
cout << "Stack overflow!
Cannot push " << value <<
endl;

        } else {
            arr[++top] = value;             cout << value << "
pushed to stack." << endl;
        }
    }
};
int main() {     int stackSize;
cout<<"Enter the stack size:"<<endl;
cin>>stackSize;     Stack
myStack(stackSize);
    int arr[stackSize];
    cout<<"Enter the elements of stack:"<<endl;
    for(int i=0;i<stackSize;i++)
    {
        cin>>arr[i];
    }
    for(int i=0;i<stackSize;i++)
    {
        myStack.push(arr[i]);
    }
    return 0;
}
```

Output



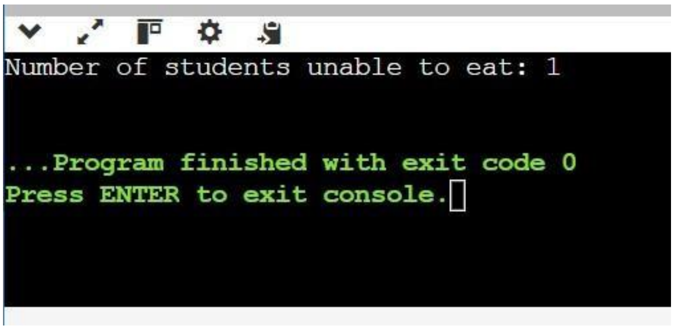
```
Enter the stack size:
4
Enter the elements of stack:
3
6
4
9
3 pushed to stack.
6 pushed to stack.
4 pushed to stack.
9 pushed to stack.
```

Q6. The school cafeteria offers circular and square sandwiches at lunch break, referred to by numbers 0 and 1 respectively. All students stand in a queue. Each student either prefers square or circular sandwiches.

Ans

```
#include <iostream>

#include        <queue>

#include        <vector>

using namespace std;


int countStudents(vector<int>& students, vector<int>& sandwiches) {    queue<int>

studentQueue;

   for (int student : students) {

studentQueue.push(student);

   }


   int sandwichIndex = 0;    int

attempts = 0;


   while (!studentQueue.empty() && attempts < studentQueue.size()) {       if

(studentQueue.front() == sandwiches[sandwichIndex]) {

studentQueue.pop();          sandwichIndex++;          attempts = 0;
```

```
        } else {
            studentQueue.push(studentQueue.front());            studentQueue.pop();
attempts++;
        }
    }


    return studentQueue.size();
}


int main() {     vector<int> students =
{1, 1, 0, 0};     vector<int> sandwiches =
{0, 1, 1, 1};
    cout << "Number of students unable to eat: " << countStudents(students, sandwiches) <<
endl;
return 0;
} Output
```



```
Number of students unable to eat: 1


...Program finished with exit code 0
Press ENTER to exit console.
```

Q7. Check the minimum value in stack.

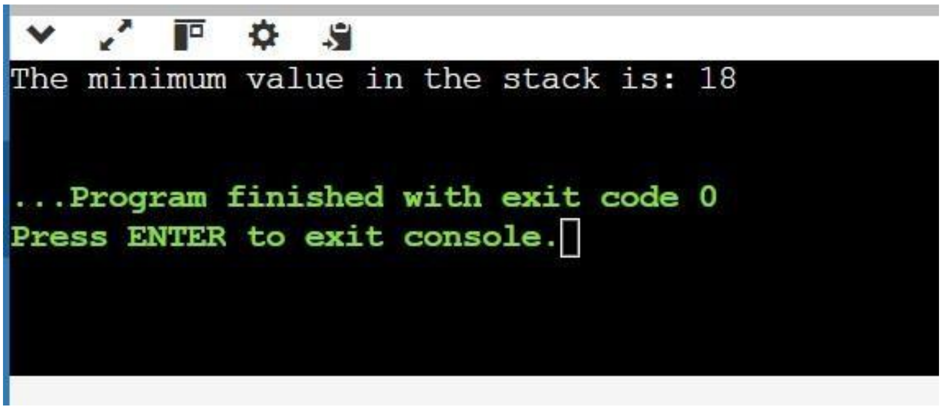
Value are {18,19,29,16,15} output {18}

Ans

```
#include      <iostream>
#include  <stack>  using
namespace std;
int main() {     stack<int>
s;
```

```
    s.push(18);

    s.push(19);

    s.push(29);

    s.push(16);

    s.push(15);


    stack<int> tempStack;     int
minVal=18;     while
(!s.empty()) {
        int x=s.top();

        s.pop();

if(x<=minVal){

x=minVal;

        }

    }


    cout << "The minimum value in the stack is: " << minVal << endl;

    return 0;

}
```

Output



```
The minimum value in the stack is: 18


...Program finished with exit code 0
Press ENTER to exit console.
```

Q8. Given a queue, write a recursive function to reverse it.

Standard operations allowed :

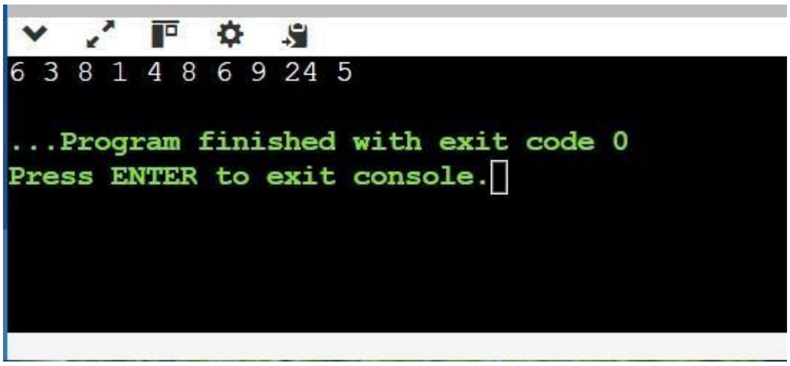
enqueue(x) : Add an item x to rear of queue. dequeue() : Remove an item from front of queue. empty() : Checks if a queue is empty or not.

Ans

```
#include <iostream> #include <queue>

using namespace std; void

reverseQueue(queue<int>& q) {

    if (q.empty()) {

return;

    }

    int front = q.front();

    q.pop();

    reverseQueue(q);

    q.push(front);

}

int main() {

queue<int> q;

    q.push(5);

    q.push(24);

    q.push(9);

    q.push(6);

    q.push(8);

    q.push(4);

    q.push(1);

    q.push(8);

    q.push(3);

    q.push(6);

reverseQueue(q);     while (!q.empty())

{        cout <<

q.front() << " ";
```

```
        q.pop();
    }


    return 0;
}
```

Output



```
6 3 8 1 4 8 6 9 24 5

...Program finished with exit code 0
Press ENTER to exit console.
```

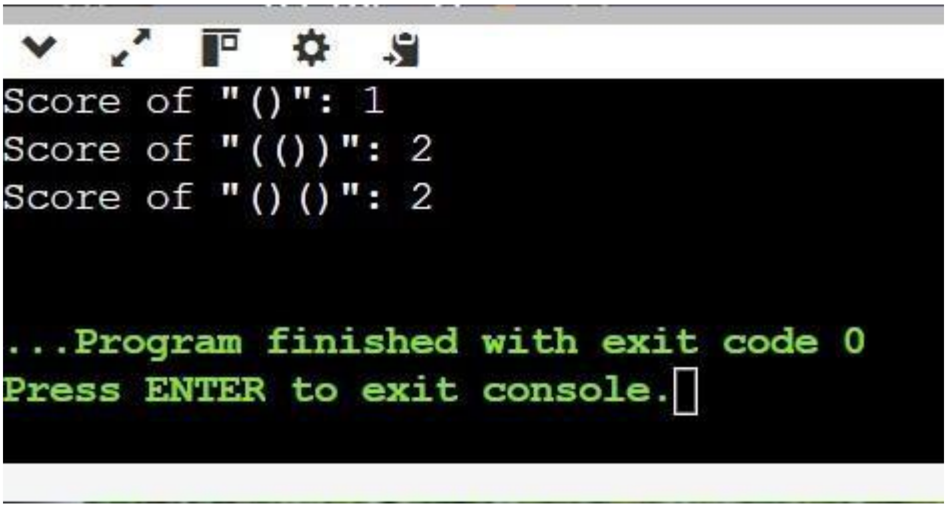
Q9. Given a balanced parentheses string s, return the score of the string.

Ans

```
#include <iostream>

#include            <stack>

#include <string> using

namespace std;


int scoreOfParentheses(string s) {

    stack<int> st;     st.push(0);


    for (char c : s) {

        if (c == '(') {

st.push(0);         } else {

int v = st.top();

st.pop();            int w

= st.top();

st.pop();             st.push(w +

max(2 * v, 1));
```

```
        }
    }

    return st.top();
}

int main() {     string
s1 = "()";     string
s2 = "(())";     string
s3 = "()()";
cout << "Score of
\"" << s1 << "\": " <<
scoreOfParenthes
es(s1) << endl;     cout
<< "Score of \"" << s2
<< "\": "
<< scoreOfParenthes
es(s2) << endl;     cout
<< "Score of
\"" << s3 << "\": "
<< scoreOfParenthes
es(s3) << endl;

    return 0;
}
```

Output



```
Score of "()": 1
Score of "(())": 2
Score of "()()": 2


...Program finished with exit code 0
Press ENTER to exit console.
```

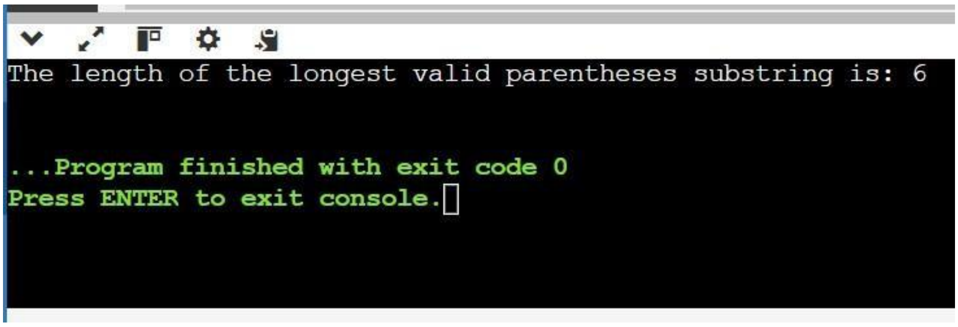
Q10. Given a string containing just the characters '(' and ')', return the length of the longest valid (well-formed) parentheses substring**.**

Ans

```
#include <iostream>

#include          <stack>

#include <string> using

namespace std;


int longestValidParentheses(string s) {

stack<int> st;     st.push(-1); // Initial base for

calculating valid lengths     int maxLength = 0;


   for (int i = 0; i < s.length(); ++i) {

       if (s[i] == '(') {

st.push(i);        } else {

st.pop();           if (st.empty())

{

st.push(i);

          } else {

              maxLength = max(maxLength, i - st.top());

          }
```

```
        }
    }

    return maxLength;
}

int main() {
    string s = "(()";
    cout << "The length of the longest valid parentheses substring is: " << longestValidParentheses(s) << endl; // Output: 2
    return 0;
}
```

Output



```
The length of the longest valid parentheses substring is: 6


...Program finished with exit code 0
Press ENTER to exit console.
```