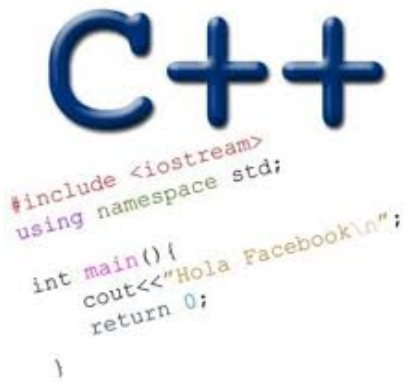
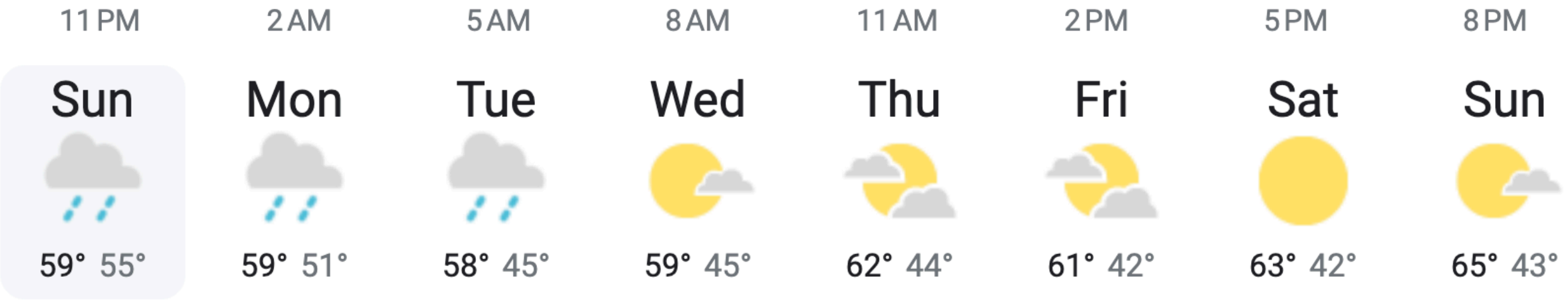
STACK

Problem Solving with Computers-II



Results for **Santa Barbara, CA**



https://leetcode.com/problems/daily-temperatures/

A stack is like a chisel — simple, yet powerful!

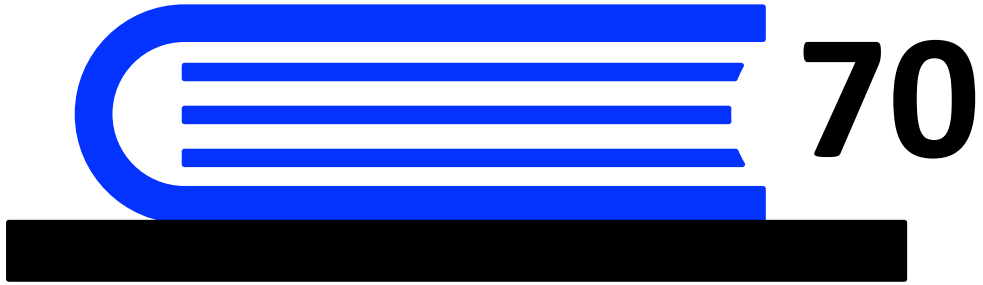
stack<int> s

Empty stack

Operations: **push()** **pop()** **top()**

stack<int> s

s.push(70)



Operations: **push()** **pop()** **top()**

```
stack<int> s
s.push(70)
s.push(50)
```

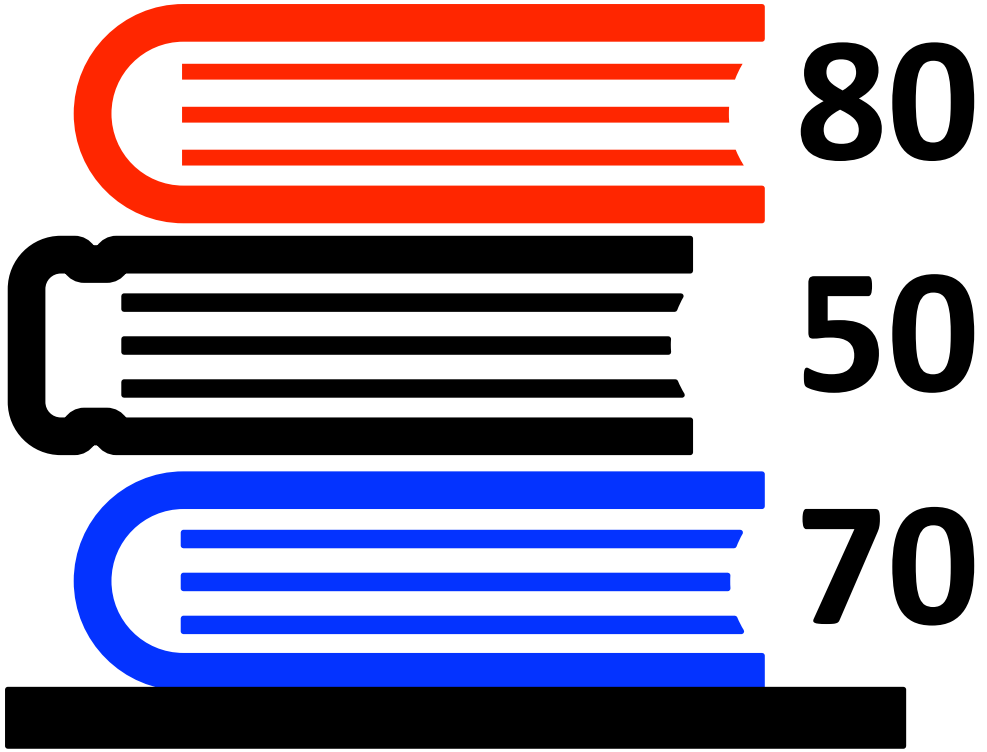
Operations: **push()** pop() top()

stack<int> s

s.push(70)

s.push(50)

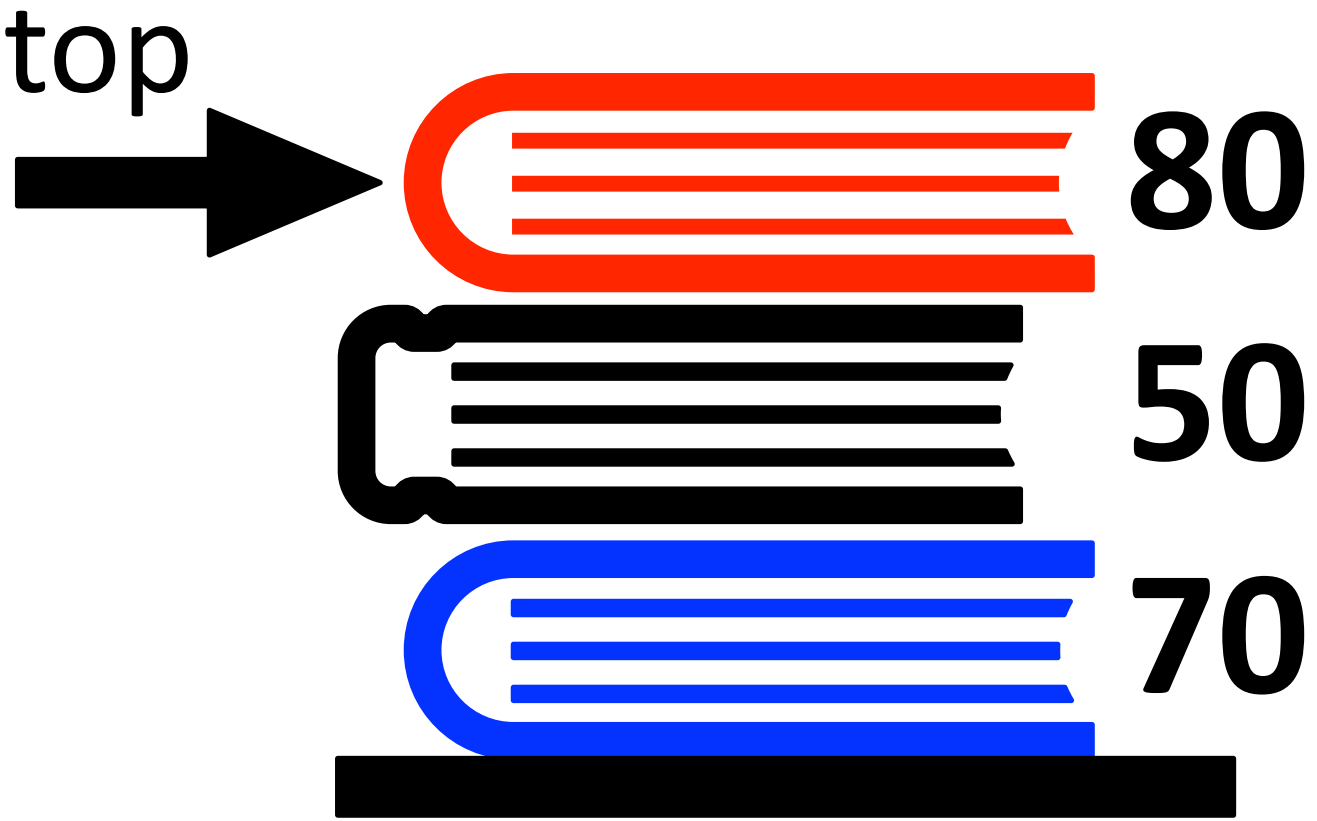
s.push(80)



Operations: **push()** pop() top()

```
stack<int> s
s.push(70)
s.push(50)
s.push(80)
```

s.top() returns 80



Operations: push() pop() **top()**

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s.push(50)
s.push(80)


s.top()
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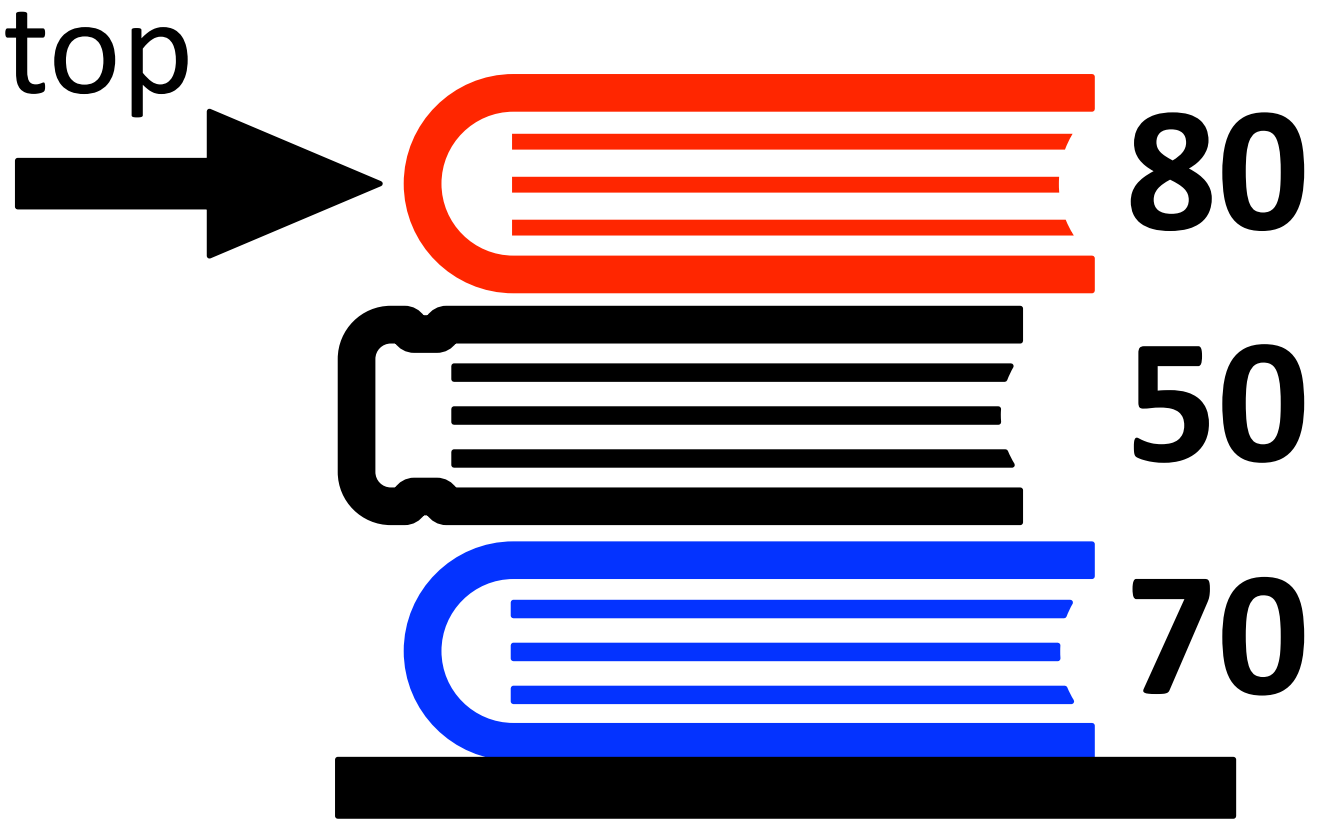
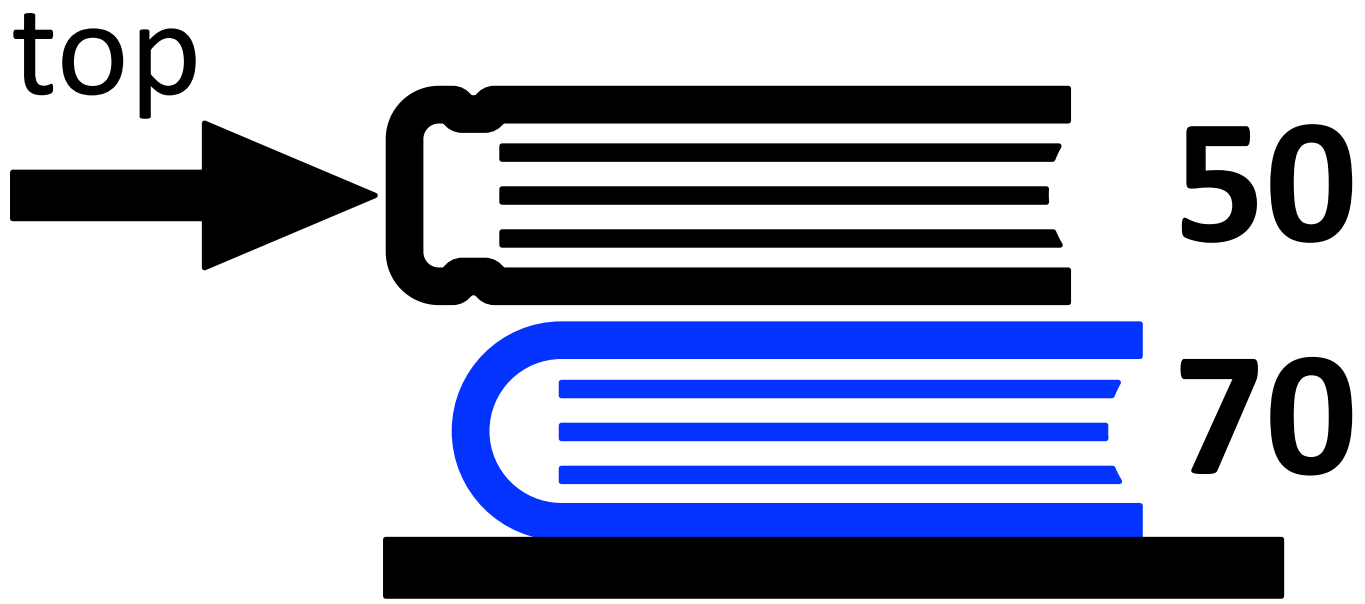


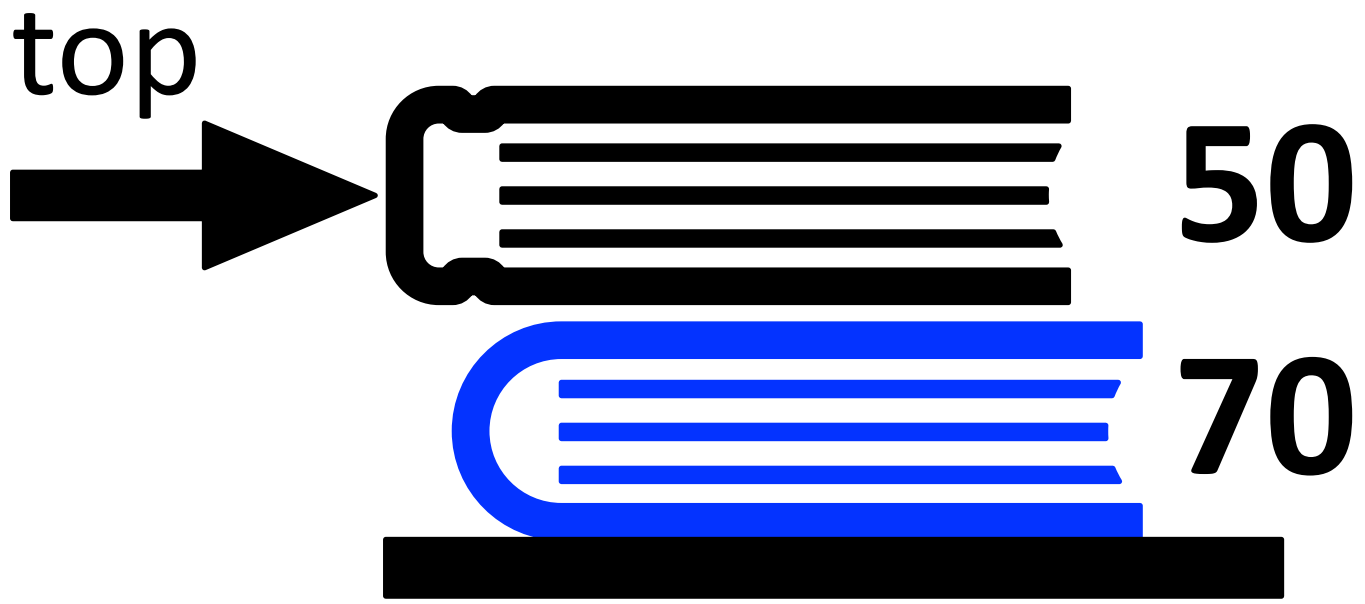
s.pop() removes value that was pushed in *last*

```
stack<int> s
s.push(70)
s.push(50)
s.push(80)


s.top()
```



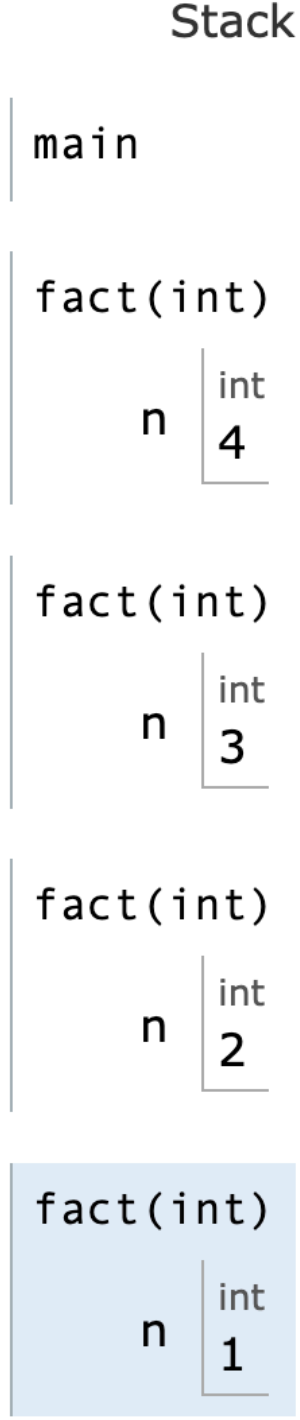
s.pop() removes value that was pushed in *last*



The Last value In is the First value Out (LIFO)

```
1  #include <iostream>
2  using namespace std;
3
4  int fact(int n){
5    if(n <= 1) return 1;
6    return n * fact(n - 1);
7  }
8
9  int main() {
10   cout<< fact(4) << endl;
11   return 0;
12 }
```

The call stack:



The Last value In is the First value Out (LIFO)

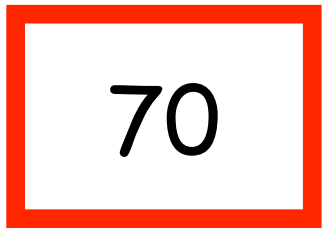
vector

list

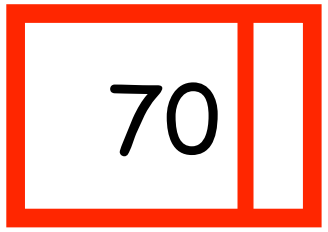
Empty stack

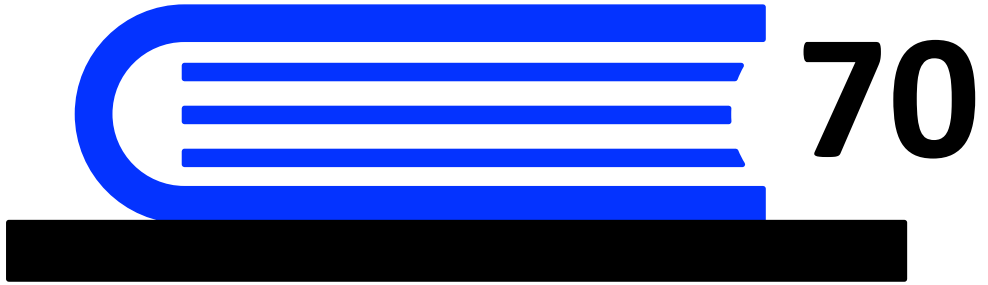
Stack Abstract Data Type

vector



list

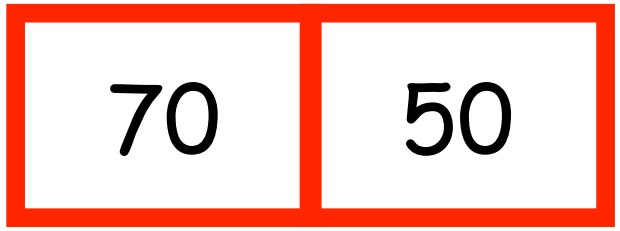




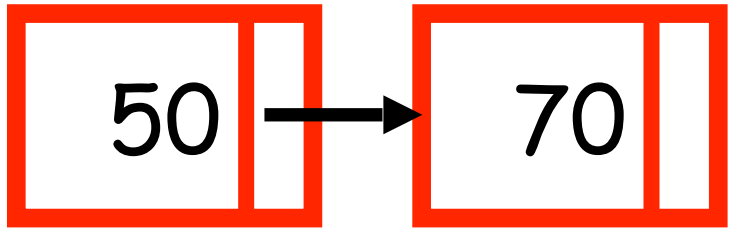
s.push(70)

Stack Abstract Data Type

vector



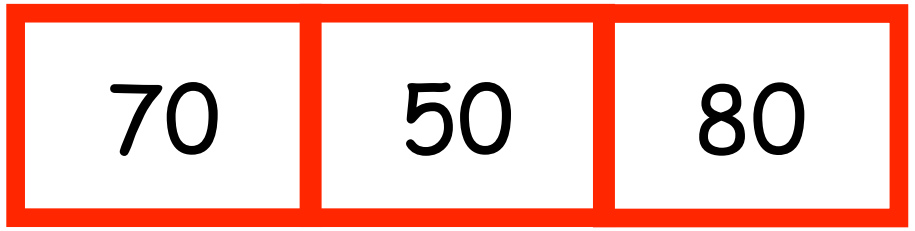
list



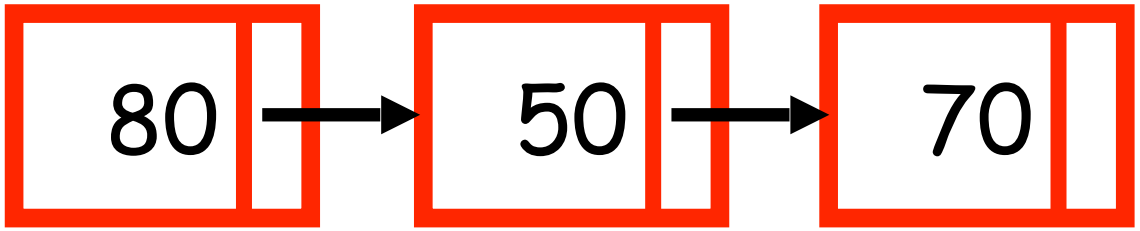
s.push(50)

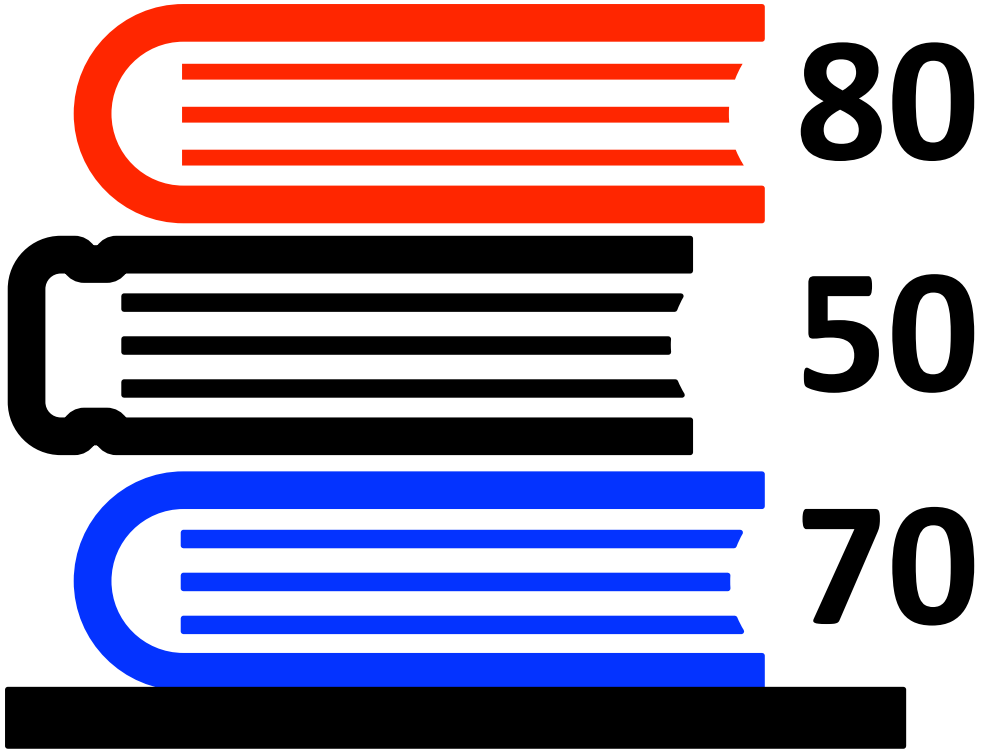
Stack Abstract Data Type

vector



list

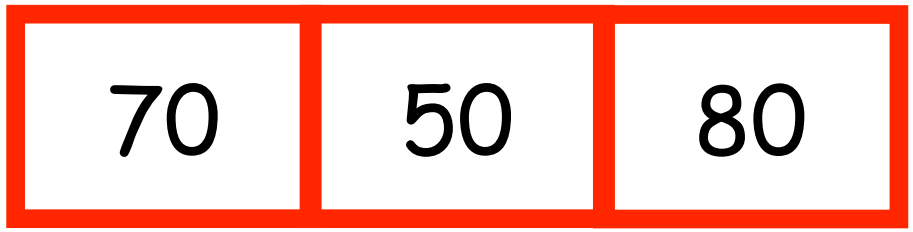


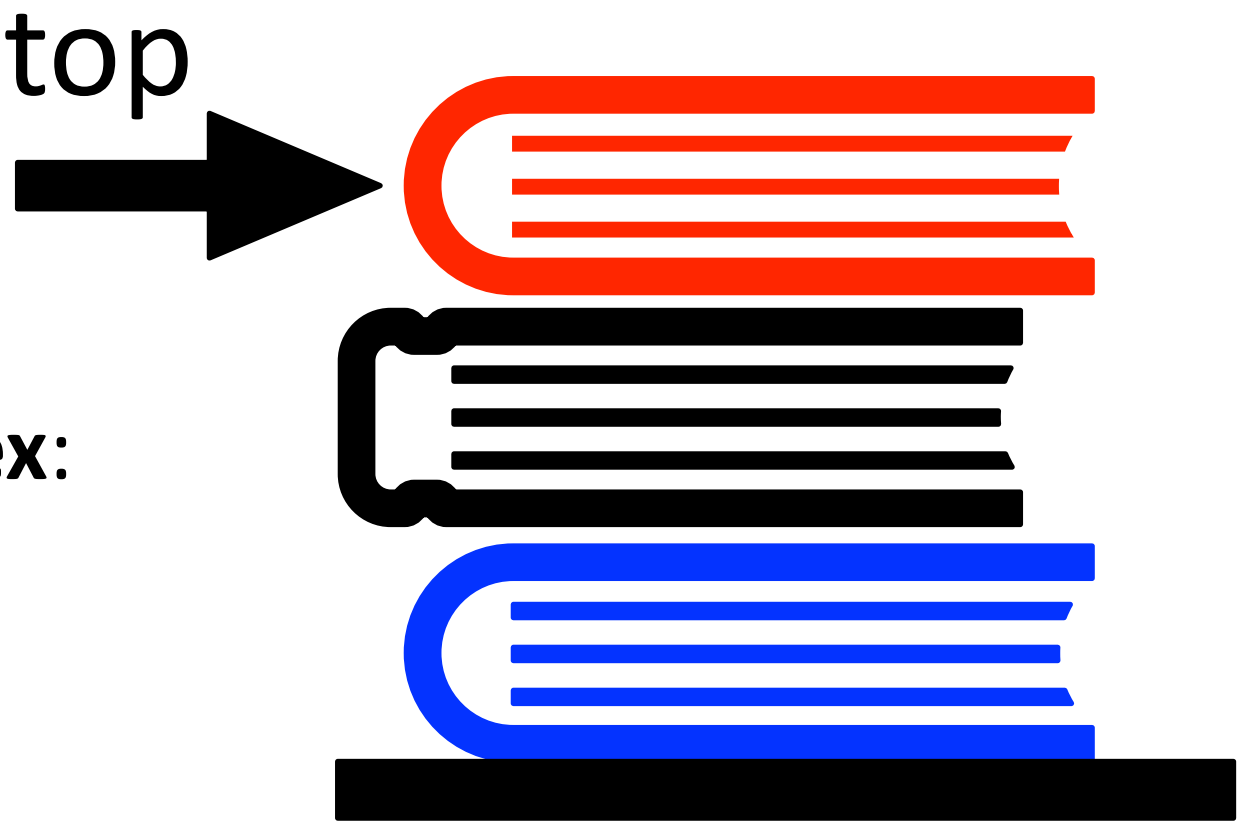


s.push(80)

Stack Abstract Data Type

vector

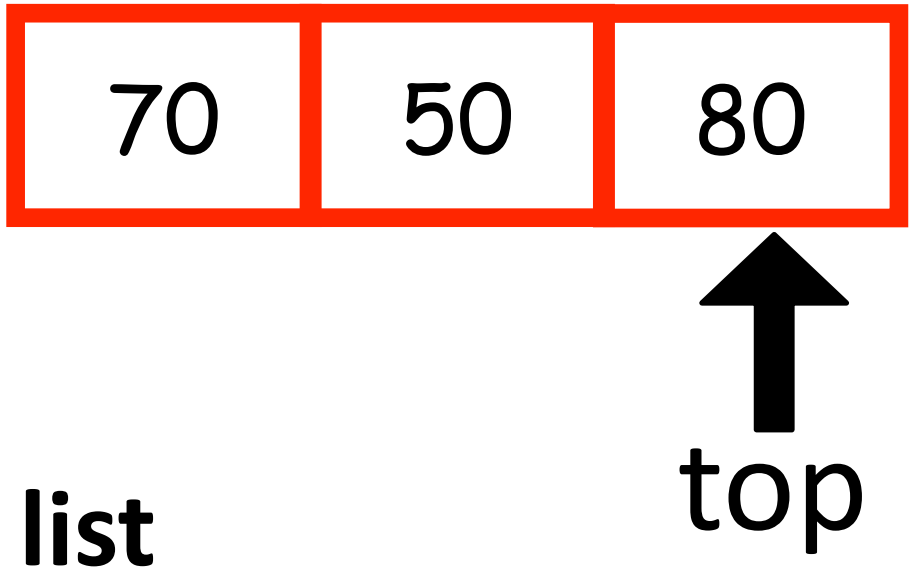




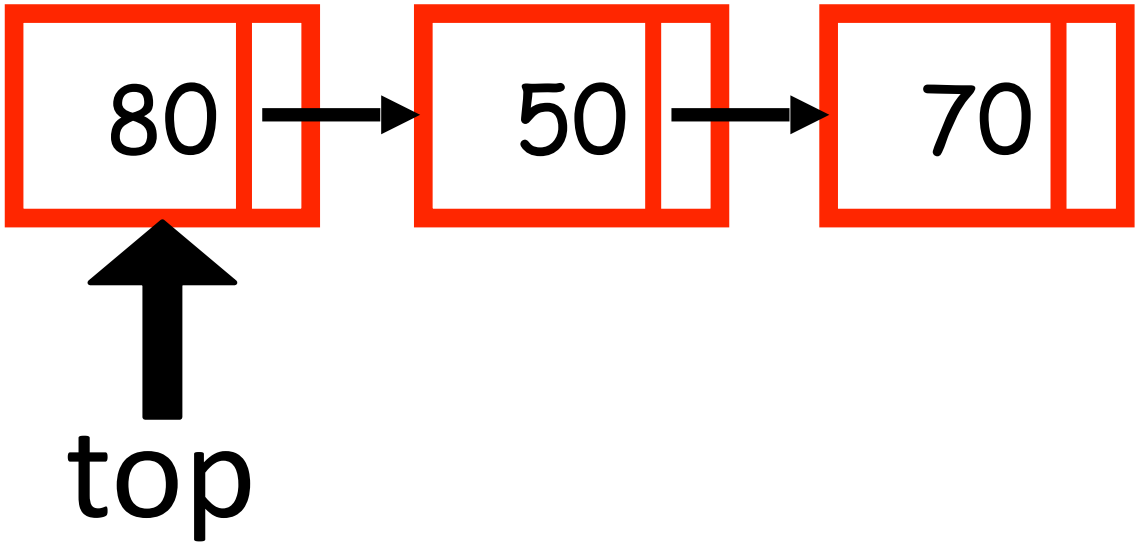
The top element is at **index**:

A. zero
B. one
C. v.size() - 1
D. v.size()

vector



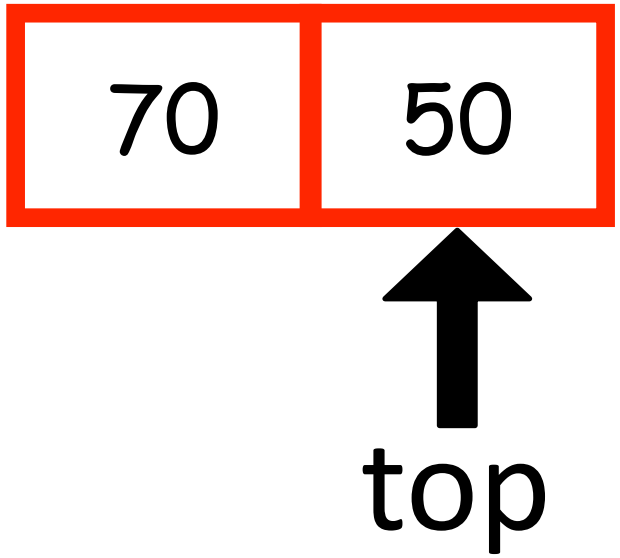
list



s.pop()

Stack Abstract Data Type

vector



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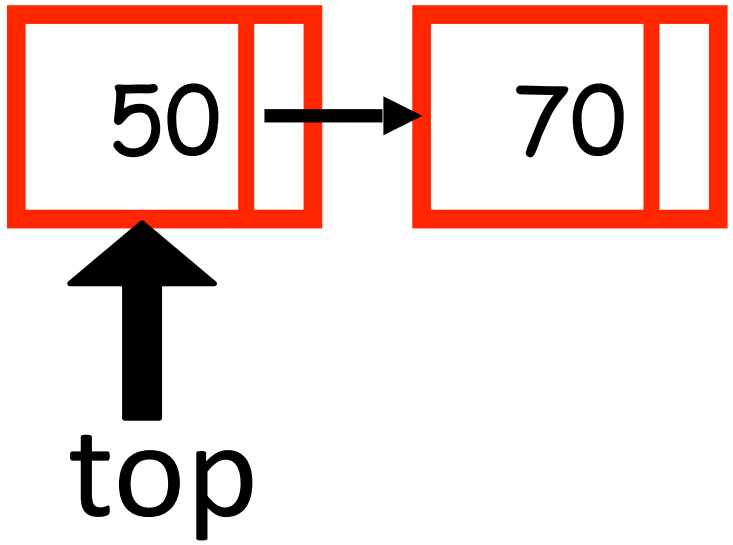
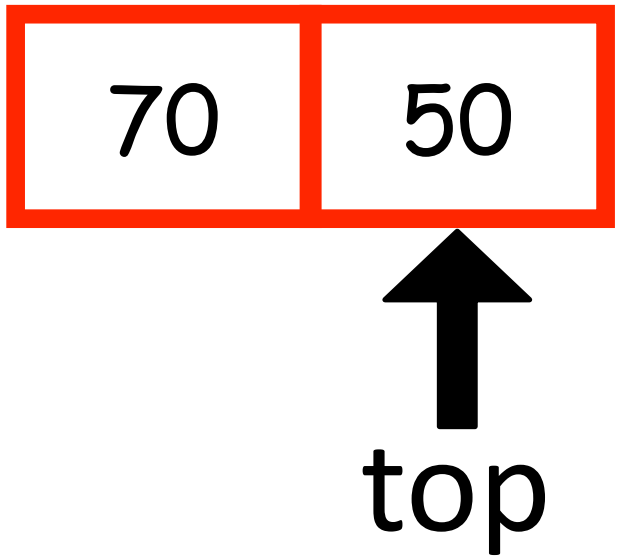


s.pop()

Stack Abstract Data Type

vector



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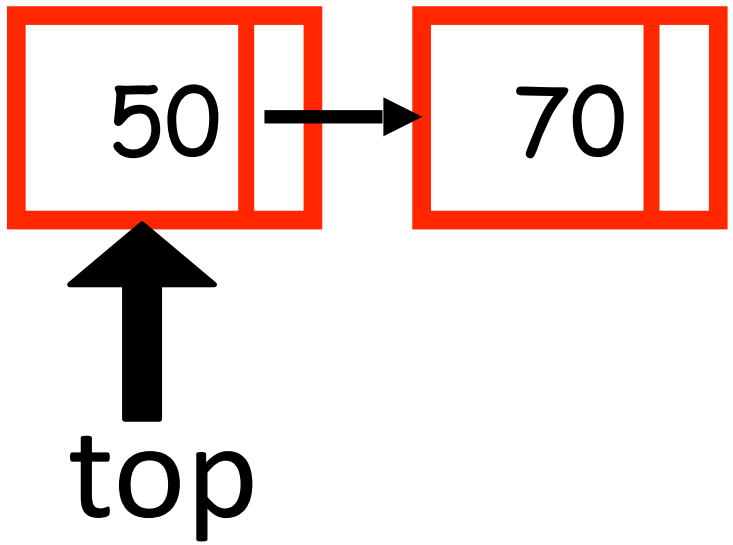
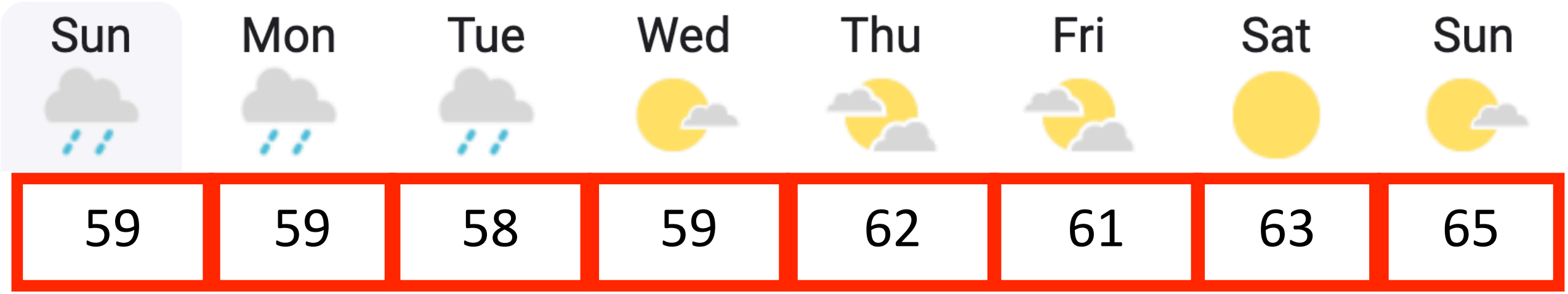


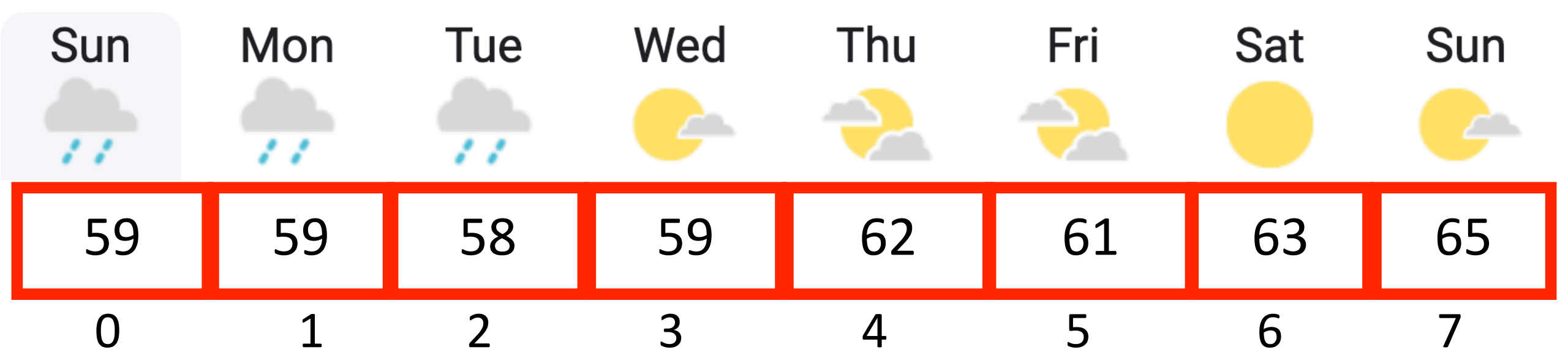
Stack Abstract Data Type

Why implement a stack at all?
After all a stack is a vector or list with a
reduced set of operations

Stack has only three operations: **push()** **pop()** **top()**

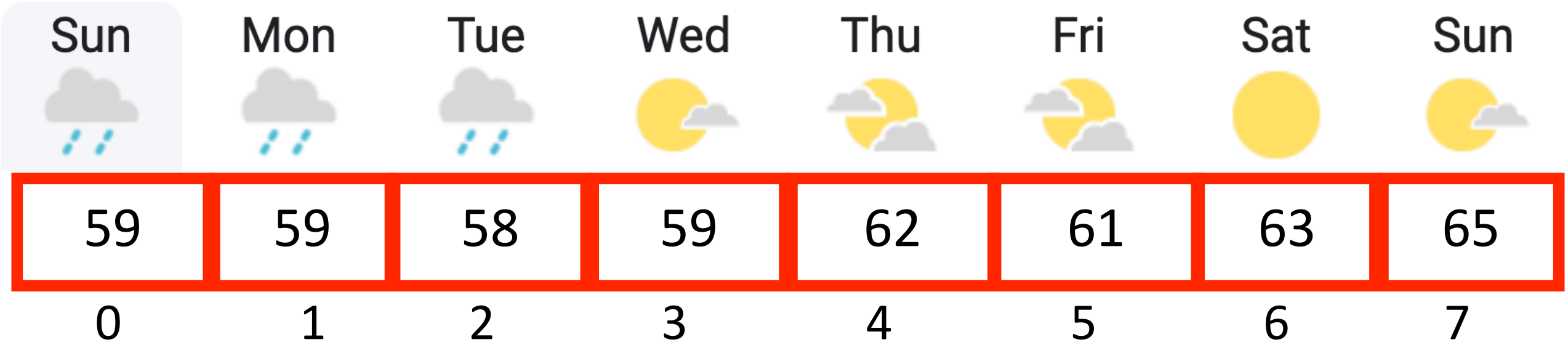


https://leetcode.com/problems/daily-temperatures/

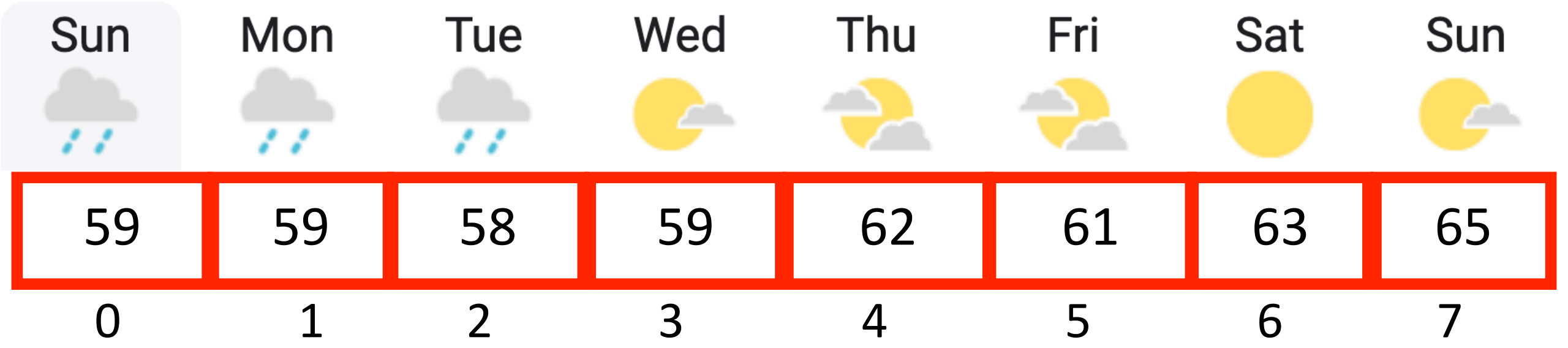


If we parse the temperatures from right to left, which day(s) should we remember to compute the answer for Day 4 (Thu)?

A. Day 5 because its the most recent day after Day 5
B. Day 6 because its the most recent warm day after Day 4
C. Day 7 because its warmest day after Day 4
D. Day 3 because Day 4 is warmer than Day 3



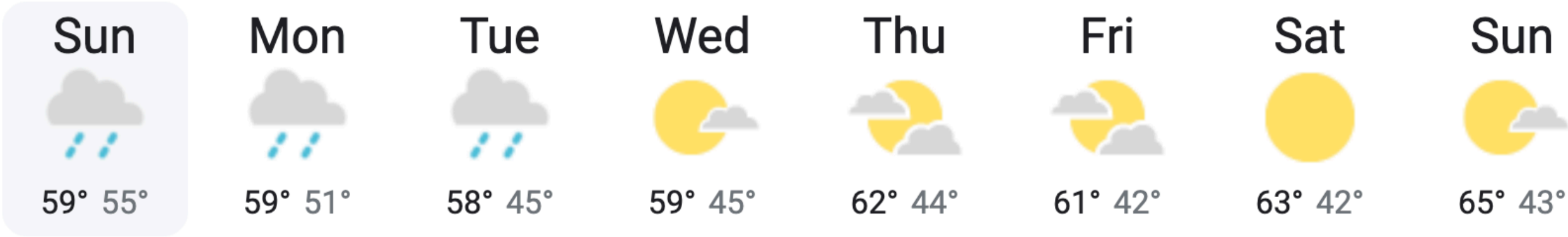
If we parse the temperatures from right to left, every day we encounter could be a potential answer (for some preceding day) — **remember potential answers in a stack!**



However, some values become stale (i.e. they are no longer a potential answer)

How can we detect stale values in the stack and permanently remove them?

- **Attempt a different solution to this problem on leetcode**
- **Spend no more than 30 minutes on it**
- **Discuss your solutions with the course staff in office hours**



A stack is useful for keeping track of history information where computation only depends on the most recent information !!

https://leetcode.com/problems/daily-temperatures/