

# Practice with Arrays

Lecture 7 – Spring 2020

# Tutoring

- Tuesday, Wednesday, Thursday
- 5pm to 7pm
- Fred Brooks 007
  - (Same building as regular office hours, opposite end of it.)
- Come for small group discussions on conceptual material!
  - Does not have the time constraints of 1:1 office hours
- Something didn't make sense in lecture? Come talk through it with a UTA in Tutoring *the same day!*

# Late Points Policy Reminder

- You can turn Problem Set assignments in after the deadline
  - Not worksheets, though!
- Late penalty is gradually applied over the course of the week after deadline
  - Submitting >1 week after deadline results in a maximum 50% penalty
- At the end of the semester up to 50 points are returned back for points taken off due to penalty
  - Only applied if you get to 100% green checkmark completion for the assignment
  - Just like insurance, there is no benefit in not using late points, they're there for emergencies and unfortunately busy weeks

# Challenge Question #1 - [pollev.com/compunc](http://pollev.com/compunc)

- What is the result of calling: **lol(3)**

```
let lol = (force: number): string => {  
  let s = "";  
  for (let i = 1; i < force; i++) {  
    s += "h";  
    for (let h = 0; h < i; h += 1) {  
      s += "e";  
    }  
  }  
  return s;  
};
```

# Notes on Nested Loops

- **General Rule:** When the closing curly brace of a loop is encountered, the loop jumps back to the start of **its matching condition**.
- An inner loop will jump back up to the inner loop's condition and an outer loop will jump back up to the outer loop's condition.
- Thus, an inner loop must complete all of its **iterations** for *each* single iteration of an outer loop.

# Code Writing Practice: The **indexOf** Function

- Given an array of number values, and a number to search for:
  1. Return the index of the number's first occurrence in the array.
  2. When the number does not exist in the array, return -1.

- Use Cases:

`indexOf([1, 2, 3], 1)` should return `0`

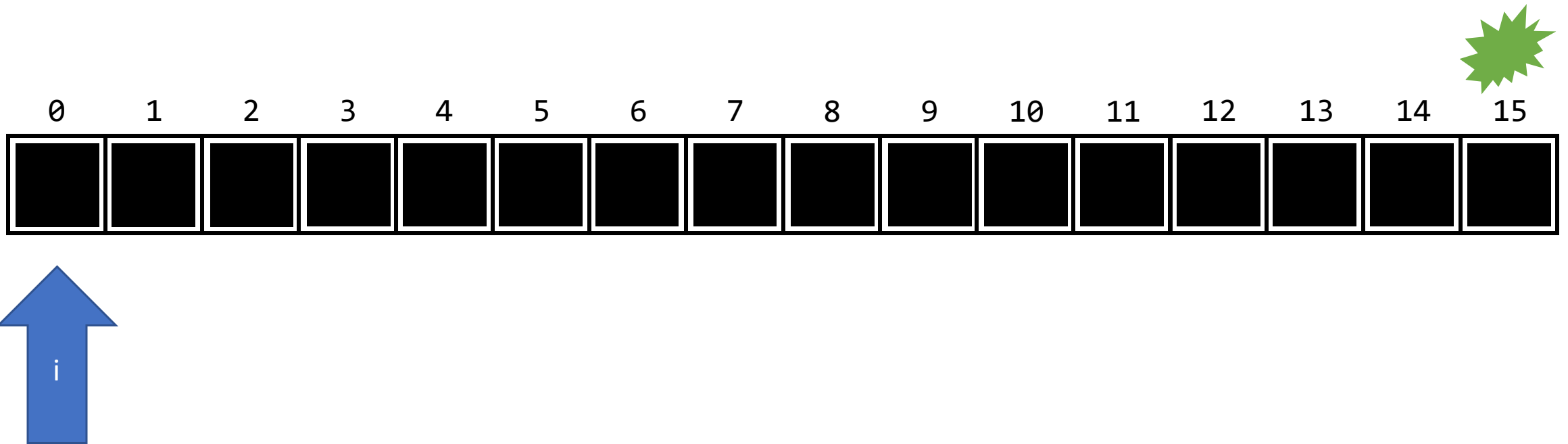
`indexOf([1, 2, 3], 2)` should return `1`

- Edge Cases:

`indexOf([1, 2, 3], 4)` should return `-1`

`indexOf([1, 2, 2], 2)` should return `1`

# The Linear Search Algorithm



Does the word “Yes” exist in this array of Strings?

# Hands-on: Implementation of **indexOf**

- In array-functions.ts
  1. Loop through every element of array **a**, starting from index **0**
  2. If an element is equal to **n**, then return its **index**
  3. Otherwise, return **-1**.
- Check-in when you have the test cases passing for indexOf.  
[pollev.com/compunc](https://pollev.com/compunc)



3. Diagram this Code Listing and then respond on PollEverywhere with the printed output.

```
1 import { print } from "intros";
2
3 export let main = async () => {
4     let letters = ["a", "b", "c", "b", "a"];
5     print(mystery(letters, "b"));
6 };
7
8 let mystery = (haystack: string[], needle: string): number => {
9     for (let i = haystack.length - 1; i >= 0; i -= 1) {
10        if (haystack[i] === needle) {
11            return i;
12        }
13    }
14    return -1;
15 };
16
17 main();
```

```
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3 export let main = async () => {
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8 let mystery = (haystack: string[], needle: string): number => {
9     for (let i = haystack.length - 1; i >= 0; i -= 1) {
10        if (haystack[i] === needle) {
11            return i;
12        }
13    }
14    return -1;
15 };
16
17 main();
```

# 4. Code Writing Practice: Clone Implementation

- The clone Function Purpose: Given a number array as input, create and return a new array with all the elements of the input array in the same order.
- Use Cases:
  - `clone([99])` returns a new array with elements [99]
  - `clone([1, 2])` returns a new array with elements [1, 2]
- Edge Cases:
  - `clone([])` returns a new, empty array
- Your task: Implement the clone function in `array-functions.ts`. It should:
  1. Create a new array
  2. Copy all elements from the input array to the new array
  3. Return the new array
- Check-in on [PollEv.com/compunc](https://pollev.com/compunc) when your clone function is working

5. Trace an Environment Diagrams for the Program Listings Below. Are the outputs the same or different?

```
1 import { print } from "intros";
2
3 export let main = async () => {
4   let a = ["hello"];
5   let b = clone(a);
6   b[0] = "world";
7   print(a[0]);
8 };
9
10 export let clone = (original: string[]): string[] => {
11   return original;
12 };
13
14 main();
```

```
1 import { print } from "intros";
2
3 export let main = async () => {
4   let a = ["hello"];
5   let b = clone(a);
6   b[0] = "world";
7   print(a[0]);
8 };
9
10 export let clone = (original: string[]): string[] => {
11   let copy = [];
12   for (let i = 0; i < original.length; i++) {
13     copy[copy.length] = original[i];
14   }
15   return copy;
16 };
17
18 main();
```

```
1 import { print } from "intros";
2
3 export let main = async () => {
4   let a = ["hello"];
5   let b = clone(a);
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13     copy[copy.length] = original[i];
14   }
15   return copy;
16 };
17
18 main();
```

6. PollEv – What is the printed output when the main function below is evaluated?

```
export let main = async () => {  
  let a: number[] = [10, 20, 30];  
  let b: number = a[1];  
  let c: number[] = a;  
  b = 100;  
  c[2] = 1000;  
  print(a);  
};
```