Mina Rizk

Big-O Notation Exercise

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Step One: Simplifying Expression

1. O(n + 10)
    - O(n)
2. O(100 * n)
    - O(n)
3. O(25)
    - O(1)
4. O(n^2 + n^3)
    - O(n^3)
5. O(n + n + n + n)
    - O(n)
6. O(1000 * log(n) + n)
    - O(n)
7. O(1000 * n * log(n) + n)
    - O(n * log(n))
8. O(2^n + n^2)
    - O(2^n)
9. O(5 + 3 + 1)
    - O(1)

10. O(n + n^(1/2) + n^2 + n * log(n)^10)

    - O(n^2)

Step Two: Calculating Time Complexity

1. logUpTo(n):

```
function logUpTo(n) {
  for (let i = 1; i <= n; i++) {
    console.log(i);
  }
}
```

- Time Complexity: O(n)

2. logAtLeast10(n):

```
function logAtLeast10(n) {
  for (let i = 1; i <= Math.max(n, 10); i++) {
    console.log(i);
  }
}
```

- Time Complexity: O(n)

3. onlyElementsAtEvenIndex(array):

```
function onlyElementsAtEvenIndex(array) {
  let newArray = [];
  for (let i = 0; i < array.length; i++) {
    if (i % 2 === 0) {
      newArray.push(array[i]);
    }
  }
  return newArray;
}
```

- Time Complexity: O(n)

4. subtotals(array):

```
function subtotals(array) {
  let subtotalArray = [];
  for (let i = 0; i < array.length; i++) {
    let subtotal = 0;
    for (let j = 0; j <= i; j++) {
      subtotal += array[j];
    }
    subtotalArray.push(subtotal);
  }
  return subtotalArray;
}
```

- Time Complexity: O(n^2)

5. vowelCount(str):

```
function vowelCount(str) {
 let vowelCount = {};
 const vowels = "aeiouAEIOU";

 for (let char of str) {
   if(vowels.includes(char)) {
     if(char in vowelCount) {
       vowelCount[char] += 1;
     } else {
       vowelCount[char] = 1;
     }
   }
 }

 return vowelCount;
}
```

- Time Complexity: O(n)

Part 3: Short Answer

1. True or false: n^2 + n is O(n^2).

    - True

2. True or false: n^2 * n is O(n^3).
    - True
3. True or false: n^2 + n is O(n).
    - False
4. What’s the time complexity of the .indexOf array method?
    - O(n)
5. What’s the time complexity of the .includes array method?
    - O(n)
6. What’s the time complexity of the .forEach array method?
    - O(n)
7. What’s the time complexity of the .sort array method?
    - O(n log n)
8. What’s the time complexity of the .unshift array method?
    - O(n)
9. What’s the time complexity of the .push array method?
    - O(1)
10. What’s the time complexity of the .splice array method?
    - O(n)
11. What’s the time complexity of the .pop array method?
    - O(1)
12. What’s the time complexity of the Object.keys() function?

- O(n)

13. What’s the space complexity of the Object.keys() function?

    - O(n)