

CSSE 220 – Object-Oriented Software Development  
 Rose-Hulman Institute of Technology

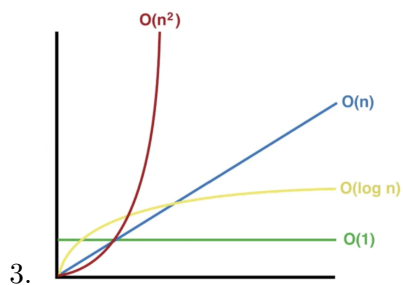
Worksheet 18

Name (Print): \_\_\_\_\_ Section: \_\_\_\_\_

1. The efficiency of an algorithm depends on \_\_\_\_\_ parameter and \_\_\_\_\_ parameter.

2. Select the correct statement for time complexity:

- 1) the number of times a particular instruction set is executed
- 2) the total time taken to execute the program



1) x-axis: \_\_\_\_\_ 2) y-axis: \_\_\_\_\_

4. Provide the order of 4 common time complexity families (algorithms) as data size increases:

\_\_\_\_\_

5. Select the correct BigO:

$3n^2$ :	$O(1)$	$O(n)$	$O(n^2)$
1,000,000:	$O(1)$	$O(n)$	$O(n^2)$
$2n^2 + n + 3$ :	$O(1)$	$O(n)$	$O(n^2)$
$n/2 + n$ :	$O(1)$	$O(n)$	$O(n^2)$

6. How many operations involved and what is BigO

```

1 static int addNum(int n1,int n2){
2     int sum = n1 + n2;
3     return sum;
4 }
5 //Num of Operations: -----
6 //BigO: -----

```

7. How many operations involved and what is BigO

```

1 public int sum(int[] a) {
2     int s = 0;
3     for (int x : a) {
4         s += x;
5     }
6     return s;
7 }
8 //Num of Operations: -----
9 //BigO: -----

```

8. How many operations involved and what is BigO

```

1 public void twoPass(int[] a) {
2     int sum = 0;
3     for (int x : a) {
4         sum += x;
5     }
6     for (int x : a) {
7         System.out.println(x);
8     }
9 }
10 //Num of Operations: -----
11 //BigO: -----

```

9. How many operations involved and what is BigO

```

1 public void printAllPairs(int[] a) {
2     for (int x : a) {
3         for (int y : a) {
4             System.out.println("(" + x + "," + y + ")");
5         }
6     }
7 }
8 //Num of Operations: -----
9 //BigO: -----

```

10. True/False Binary search must be sorted

11. Complete with BigO examples:

BigO	Example
$O(1)$	
$O(n)$	
$O(n^2)$	
$O(\log n)$	
$O(n \log n)$	

12. Express Cost in terms of BigO for ArrayList:

Operation	Cost
get(index)	
add(index, element)	
remove(index))	
size()	

13. \_\_\_\_\_: A linear data structure where the elements are linked using pointers

14. Node consists of : 1) \_\_\_\_\_ and 2) \_\_\_\_\_

15. Compare arrayList and LinkedList for Access, Search, Insertion, Deletion: \_\_\_\_\_

16. Sketch a `LinkedList<String>` containing the strings "two", "more", and "weeks".

17. What is the worst case for ArrayList

```
1 int newNum = list1.get(k); // where 0 <= k < list1.size()
2 //BigO: -----
```

18. What is the worst case for ArrayList

```
1 list1.add(0, 100); // where list1.size() > 0
2 //BigO: -----
```

19. Give the Big-O runtime for each of the code snippets below. In each case, n refers to the size of the input array or the integer n itself

```
public static long method1(int[] arr) {
    long result = 0;

    int n = arr.length;
    for(int j = 0; j < n; j++) {
        for(int k = 0; k < 10000; k++) {
            result += (j*k);
        }
    }

    for(int j = 0; j < n; j++) {
        result += (2 * j) - 3;
    }

    return result;
}
```

1) \_\_\_\_\_

```
public static void method2(int[] arr) {
    int n = arr.length;
    for(int i = 0; i < n - 1; i++) {
        for(int j = 0; j < (n - i - 1); j++) {
            if(arr[j] > arr[j+1]) {
                int temp = arr[j];
                arr[j] = arr[j+1];
                arr[j+1] = temp;
            }
        }
    }
}
```

2) \_\_\_\_\_