

Time and Space Complexity – Revision

Question 1/5. Consider the following functions:

$$f(n) = 2^n$$

$$g(n) = n!$$

$$h(n) = n^{\log n}$$

Which of the following statements about the asymptotic behavior of $f(n)$, $g(n)$, and $h(n)$ is true?

1. $f(n) = O(g(n)); g(n) = O(h(n))$
2. $f(n) = \Omega(g(n)); g(n) = O(h(n))$
3. $g(n) = O(f(n)); h(n) = O(f(n))$
4. $h(n) = O(f(n)); g(n) = \Omega(f(n))$ **(correct answer)**

Question 2/5. The increasing order of following functions in terms of asymptotic complexity is:

$$f_1(n) = n^{0.999999} \log n$$

$$f_2(n) = 10000000n$$

$$f_3(n) = 10000000^n$$

$$f_4(n) = n^2$$

1. $f_1(n); f_4(n); f_2(n); f_3(n)$
2. $f_1(n); f_2(n); f_3(n); f_4(n)$
3. $f_2(n); f_1(n); f_4(n); f_3(n)$
4. $f_1(n); f_2(n); f_4(n); f_3(n)$ **(correct answer)**

Question 3/5. Consider the following functions:

$$f(n) = 3n\sqrt{x}$$

$$g(n) = 2\sqrt{x} \log_2 n$$

$$h(n) = n!$$

Which of the following is true?

1. $h(n)$ is $O(f(n))$
2. $h(n)$ is $O(g(n))$
3. $g(n)$ is not $O(f(n))$
4. $f(n)$ is $O(g(n))$ **(correct answer)**

Question 4/5. What will be the time complexity of the following code?

```
Void func(){  
    for (int i = 0, i < n, i++) {  
        ✓ for (int j = 0, j < n; j++){  
            Print("i+j");  
        }  
    }  
}
```

```
        }  
    }  
}
```

1. $O(\log N)$
2. $O(N)$
3. $O(N \log N)$
4. $O(N*N)$ (**correct answer**)

Question 5/5. An array of n numbers is given, where n is an even number. The maximum as well as the minimum of these n numbers needs to be determined. Which of the following is TRUE about the no. of comparisons needed?

1. Atleast $2n-C$ comparisons are needed (C is constant)
2. Atmost $1.5n-2$ comparisons are needed (**correct answer**)
3. Atleast $n \log_2 n$ comparisons are needed
4. None of the above