2025-08-27

# Complexity (Solutions)

## Questions

1. Put a checkmark in the box corresponding to true statements.
	* Abstract data types have exactly one implementation.
	* Data structures are generally useful to store and retrieve data.
	* A data type generally comes with allowed operations.
	* In data structures classes, ergonomics is the main metrics to compare programs.
	* In data structures classes, hardware is generally ignored.
2. Rank the following from 1 (“best”, fast to execute, slow to grow) to 5 (“worst”, fast to grow, slow to execute):
	* cubic
	* linear
	* linearithmic
	* logarithmic
	* exponential
* Solution
* From fastest to execute to slowest to execute:
	1. logarithmic
	2. linear
	3. linearithmic
	4. cubic
	5. exponential
1. Complete the following sentences:
	* A quadratic order of magnitude is denoted ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟.
	* A ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ order of magnitude is denoted $O\left(c\right)$.
	* A factorial order of magnitude is denoted ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟ ͟.
* Solution
	+ A quadratic order of magnitude is denoted ͟O͟(͟n͟²͟)͟.
	+ A ͟c͟o͟n͟s͟t͟a͟n͟t͟ order of magnitude is denoted $O\left(c\right)$.
	+ A factorial order of magnitude is denoted ͟O͟(͟n͟!͟)͟.

## Problems

1. Write a code snippet (no need to include using statements or Main header) that displays the sum of all the values in a score int array that you can suppose declared and initialized. What is the worst case time complexity of the algorithm you wrote, relative to the size $n$ of the array score?
* Solution
* int sum = 0;
 for(int i = 0; i < score.Length; i++){sum += score[i];}
 Console.WriteLine($"The sum is {sum}.");
* This algorithm is linear: it goes through the array once.