

Questions based on lecture 1: Introduction to Data Structures

1. How is an algorithm different from a program? What is the use of data structures in algorithms?
2. What is an Algorithm?
 - a. Step by step description to transform the input to the desired output.
 - b. Finite sequence of instructions to transform the input to the desired output.
 - c. Finite set of instructions to transform the input to the desired output.
 - d. All of the above
3. Write pseudocode for linear search. (specifying proper input and output)
4. Analyse the following algorithm by counting the number of primitive operations:

arrayMax(A, n):

Input: An array A of n integers

Output: the max element

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1 max = A[0]
2 for i = 1 to n-1 do
3 if (A[i] > max) then max = A[i]
4 return max
```

5. Give instances for best case and worst case of the above algorithm.
6. If algorithms A, B, C and D run in n^2 , 2^n , 3^n and $n \log n$ time respectively, Which of the following is true?
 - a. A is better than B
 - b. C is better than D
 - c. B is better than D
 - d. B is better than A
7. Which of the following is not true?
 - a. $f(n) = O(g(n)) \Rightarrow g(n) = \Omega(f(n))$
 - b. $f(n) = \theta(g(n)) \Rightarrow g(n) = O(f(n))$
 - c. $f(n) = O(g(n)) \Rightarrow f(n) = o(g(n))$
 - d. $f(n) = o(g(n)) \Rightarrow f(n) = O(g(n))$
8. The minimum number of arithmetic operations required to evaluate the polynomial $P(X) = X^5 + 4X^3 + 6X + 5$ for a given value of X using only one temporary variable.
 - a. 6
 - b. 7
 - c. 8
 - d. 9