Quiz 1 - Asymptotic Notations and Correctness of Algorithms

Due Jan 11 at 11:59pm **Points** 10 **Questions** 9
Available until Jan 12 at 11:59pm **Time Limit** None **Allowed Attempts** 2

Instructions

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This quiz will test your understanding of the material covered so far this week (MLOs).

This is an online quiz. There will be no time limit to the quiz. You can attempt the quiz twice and the best of the scores will be retained. This is open notes and open internet quiz but refrain from discussing with anybody during the exam.

Note that this test cannot be taken past the due date for any credit.

This quiz is worth 10 points.

You can view the correct answers here after the due date.

Take the Quiz Again

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	11 minutes	10 out of 10

Answers will be shown after your last attempt

Score for this attempt: **10** out of 10
Submitted Jan 11 at 5:40pm
This attempt took 11 minutes.

Question 1 1 / 1 pts

Is the following a property that holds for all non-decreasing positive functions f and g? (True=Yes/ False=No)

If $f(n) = O(n^2)$ for $c=1$ and $n_0=0$ and

$g(n) = \text{Theta}(n^2)$ for $n_0=0$ and $c_1=1$ and $c_2=1$

then $f(n) = O(g(n))$.

- (●) True
- ( ) False

Question 2

2 / 2 pts

Rank the following functions by increasing order of growth:

$\log(n!)$, $10000n^2$, $\log(n^3)$, 2^n, $n^2\log(n)$

- ( ) $\log(n!)$, $n^2\log(n)$, $10000n^2$, $\log(n^3)$, 2^n
- (●) $\log(n^3)$, $\log(n!)$, $10000n^2$, $n^2\log(n)$, 2^n
- ( ) $n^2\log(n)$, $\log(n!)$, $10000n^2$, $\log(n^3)$, 2^n

Question 3

1 / 1 pts

Let W(n) and A(n) denote respectively, the worst case and average case running time of an algorithm executed on an input of size n. which of the following is ALWAYS TRUE?

- (●) $A(n) = O(W(n))$

- $A(n) = \Theta(W(n))$
- $A(n) = \Omega(W(n))$
- None of the options

Question 4

1 / 1 pts

Which of the following can be used to compare two algorithms?

- computers on which programs which implement the two algorithms are run
- number of input parameters required for two algorithms
- implementations of the two algorithms
- growth rates of the two algorithms

Question 5

1 / 1 pts

If you are given different versions of the same algorithm with the following complexity classes, which one would you select?

- Quadratic
- Logarithmic
- Polynomial
- Linear

Question 6

1 / 1 pts

When we say algorithm A is asymptotically more efficient than B, what does that imply?

- B will always be a better choice for all inputs
- A will always be a better choice for large inputs
- B will always be a better choice for small inputs
- A will always be a better choice for small inputs

Question 7

1 / 1 pts

Consider the following algorithm

```
1 Bubble-sort(a)
2   for i = a.length() to 1
3       for j = 1 to i-1
4                if a[j]>a[j+1]
5                         swap(a[j],a[j+1]);
6                end if
```

What is its basic operation (write the line number of code which would define the execution time of the code)?

4

Question 8

1 / 1 pts

What is the basic operation (that which is executed maximum number of times) in the following code?

```
reverse(a):
    for i = 1 to len(a)-1
        x = a[i]
        for j = i downto 1
            a[j] = a[j-1]
        a[0] = x
```

- (●) a[j] = a[j-1]
- ( ) a[0] = x
- ( ) for j = i to 1
- ( ) x = a[i]

Question 9

1 / 1 pts

What is the correct loop invariant for the below code:

```
    for i in range(len(A)): # in pseudo-code for i=0,...,len(A)-1
        answer += A[i]
    return answer
```

- (●) At the start of iteration i of the loop, the variable answer should contain the sum of the numbers from the subarray A[0:i-1].
- ( ) The loop stops when i reaches the last element of the array.
- ( ) The loop iterates from i ranging from 0 to length of the array.

The result of this code will be sum of all the elements of the array.

Read the exploration: Proving Correctness of an Algorithm

Quiz Score: **10** out of 10