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Week 02 Quiz

This is a preview of the draft version of the quiz.

By submitting work for this quiz I hereby declare that I understand the University's policy on academic integrity (https://academicintegrity.unimelb.edu.au/) and that the work submitted is original and solely my work, and that I have not been assisted by any other person (collusion) apart from where the submitted work is for a designated collaborative task, in which case the individual contributions are indicated. I also declare that I have not used any sources without proper acknowledgment (plagiarism). Where the submitted work is a computer program or code, I further declare that any copied code is declared in comments identifying the source at the start of the program or in a header file, that comments inline identify the start and end of the copied code, and that any modifications to code sources elsewhere are commented upon as to the nature of the modification.

Quiz Type	Graded Quiz
Points	10
Assignment Group	Assignments
Shuffle Answers	Yes
Time Limit	No Time Limit
Multiple Attempts	Yes
Score to Keep	Highest
Attempts	Unlimited
View Responses	Always
Show Correct Answers	No
One Question at a Time	Yes
Lock Questions After Answering	No

Due	For	Available from	Until
-	Everyone	-	Aug 18 at 23:59

Preview

Correct answers are hidden.

Score for this attempt: **10** out of 10
Submitted Aug 12 at 17:00
This attempt took 2 minutes.

Question 1

1 / 1 pts

On my machine, a certain $O(n^2)$ sorting algorithm takes one second to sort 1000 random items. Sorting 100,000 random items can be expected to take:

- about one day
- 10-15 minutes
- (selected) 2-3 hours
- almost one year
- 1-2 minutes

That's right. We would expect 100 times as many elements to take 100 x 100 = 10,000 times as long to be sorted.

Question 2

1 / 1 pts

If f(n) is O(g(n)) then f(n) grows asymptotically no faster than g(n).

- (selected) True

A function f(n) is O(g(n)) if g(n) defines an upper bound on the growth of f(n) as n becomes large

- False

Question 3

1 / 1 pts

Consider the following statement:

$n(n+1) \in O(n^2)$

- (●) True

  If you expand n(n+1) out you get the quadratic expression $n^2 + n$. The dominant term in this expression is n^2 and consequently n(n+1) is $O(n^2)$.

- ( ) False

Question 4

1 / 1 pts

Consider the function $t(n) = 57n^4 + 10n^2 + 75$.

$t(n) \in O(g(n))$ where g(n) is (select all that apply):

- [ ] n^2
- [x] n^4
- [ ] n
- [x] n^7

Question 5

1 / 1 pts

Which of the following claims about growth rate are correct:

- [ ] $\sqrt{n} \in O(\sqrt[3]{n})$
- [ ] $\sqrt{n} \in O(\log_{10} n)$
- [ ] $(2n \log_2 n)^2 \in O(n^2)$
- [ ] $\log_2 n \in O\left(\frac{1}{\sqrt{n}}\right)$

- [x] $3n^3 + n\sqrt{n} \in O(n^3)$

That's right, only one of the statements is correct.

Question 6

1 / 1 pts

Which of the following claims are correct:

- [ ] $\sqrt{n} \in O(\sqrt[3]{n})$
- [ ] $\log_2 n \in O\left(\frac{1}{\sqrt{n}}\right)$
- [x] $2^{n+1} \in \Theta(2^n)$
- [x] $3n^3 + n\sqrt{n} \in O(n^3)$
- [ ] $\sqrt{n} \in O(\log_{10} n)$

That's right, only two of the statements are correct.

Question 7

1 / 1 pts

Which of the following claims are correct:

- [x] $\sum_{i=1}^{n} 3^i \in \Theta(3^{n+1})$
- [ ] $\sum_{i=1}^{n} 2^i \in \Theta(3^n)$
- [x] $\sum_{i=1}^{n} 3^i \in \Theta(3^n)$
- [x] $\sum_{i=1}^{n} 3^i \in \Theta(3^{n-1})$

That's right.

Question 8

1 / 1 pts

2^{2n} is in $O(2^n)$

- True
- False

That's correct!

2^{2n} is equivalent to 2^n 2^n. Consequently, 2^n is not an upper bound on 2^{2n}!

Question 9

1 / 1 pts

Given an array of n items, A, what is the Big-Θ complexity of retrieving the element at index k in the array (A[k])?

- Θ(logkn)
- Θ(n)
- Θ(kn)
- Θ(1)

Correct!

Accessing the element at index k in an array is a constant time operation -- it does not depend on the number of items in the array.

Question 10

1 / 1 pts

$n^2 + 5n$ is $\Theta(g(n))$ where $g(n)$ is:

- Both n and n^2
- n^2
- 1
- n

Correct!

Recall that a function f(n) is $\Theta(g(n))$ if and only if it is in both $\Omega(g(n))$ and $O(g(n))$.

Quiz Score: **10** out of 10