Warm-Ups 07

⚠ This is a preview of the published version of the quiz

Started: Mar 4 at 12:59pm

Quiz Instructions

⋮⋮

Question 1   2 pts

The recurrence for binary search can be represented by $T(n) = T(n/2) + 1$. You may assume $T(1) = 2$ if you want to write out a few examples. Which of the following holds true for this recurrence?

○ $T(n) \in \Theta(\log n)$

○ $T(n) \in \Theta(n)$

○ $T(n) \in \Theta(n \log n)$

○ $T(n) \in \Theta(n^2)$

○ $T(n) \in \Theta(2^n)$

⋮⋮

Question 2   2 pts

We conduct the "merge" part of Merge Sort on two lists of numbers, each of length n. Let x represent the number of comparisons made during this merge. Which of the following is the most accurate statement about the possible values of x?

○ $x \leq 2n - 1$

○ $1 \leq x \leq 2n - 1$

○ $n \leq x \leq 2n - 1$

○ $n \leq x$

1

⋮

Question 3 2 pts

Compute the first six terms of the following recurrent sequence: $a_n = 3a_{n-1} + 4a_{n-2}$, with base cases $a_0 = 0, a_1 = 1$. What is a_5?

○ 175

○ 185

○ 195

○ 205

⋮

Question 4 2 pts

The Online Encyclopedia of Integer Sequences (oeis.org) is an amazing resource to know about! Go there and enter the first six terms of the sequence in the previous problem, separated by commas. Which of the following closed form expressions describes the sequence? Hint: look at the "Formulas" section under the OEIS entry.

○ $a_n = 3a_{n-1} + 4a_{n-2}$

○ $a_n = 4a_{n-1} - (-1)^n$

○ $a_n = \frac{4^n - (-1)^n}{5}$

○ $a_n = n^2(1-n)^2 - 1$

⋮

Question 5 2 pts

Given the recurrence $a_n = 2a_{n-1} - a_{n-2} + 2$, with base cases $a_0 = 1$, $a_1 = 2$, what is a_{100}? Hint: write out a few terms, and try to guess an explicit formula.

[ ]

2

3/4/2024, 12:59 PM