Assignment 10

The due date for submitting this assignment has passed.
Due on 2020-04-08, 23:59 IST.

1) Consider a heap \( T \) with 100 elements. Assume that the keys are numbers from 1 to 100. Assume that the priorities are also numbers from 1 to 100. 1 point

The maximum possible height of \( T \) is

- 99
- 50
- 7
- 100

No, the answer is incorrect.
Score: 0
Accepted Answers:
100

2) Consider a heap \( T \) with \( n \) elements. Assume that the keys are numbers from \( 1 \) to \( n \). Assume that the priorities randomly chosen, uniformly and independently for each key from \([0, 1]\). The expected height of \( T \) is 1 point

- \( O(n) \)
- \( O(n^2) \)
- \( O(1) \)
- \( O(\log n) \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( O(\log n) \)

3) Consider a heap \( T \) where the keys are numbers 1 to 15. Assume that the height of \( T \) is 4. The key value of the root node is 1 point

- 1
- 8
- 15
- 7

No, the answer is incorrect.
Score: 0
Accepted Answers:
8

4) Let \( H \) be a 2-universal family of hash functions from set \( M = \{0, 1, \ldots, m \} \) to \( N = \{0, 1, \ldots, n \} \), with \( m \geq n \). 1 point

Let \( x \) be any element of \( M \). Let \( X \) denote the number of elements \( y \) in \( M \) such that \( h(x) = h(y) \) where \( h \) is chosen uniformly at random from \( H \). Which of the following statements are true?

- \( E[X] = m \) for some \( x \)
- \( E[X] \leq \frac{m}{2} \) for every \( x \)
- \( E[X] > \frac{m}{2} \) for every \( x \)
- \( E[X] \geq \frac{m}{2} \) for some \( x \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( E[X] \leq \frac{m}{2} \) for every \( x \)

5) Assume that the size of the dynamic set is \( O(n) \). The expected time taken for searching an element in a hash table of size \( O(n) \) is 1 point

- \( (n \log n) \)
- \( (n) \)
- \( (\log n) \)
- \( O(1) \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( O(1) \)