

## Unit 3 - Week 1

## Course outline

How does an NPTEL online course work?

## Week 0

## Week 1

- Lecture 1: Insertion sort
- Lecture 2: Analysis of Insertion Sort
- Lecture 3: Asymptotic Analysis
- Lecture 4: Recurrence of Merge Sort
- Lecture 5: Substitution Method
- Lecture notes: Week 1
- Week 1: Examples of Asymptotic Notation
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## Week 2

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Details Solution

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## Assignment 1

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

1) In Insertion sort, for the array  $[34, 8, 64, 51, 32, 21]$ , how will the array elements look like after second iteration

1 point

- (a) 8, 21, 32, 34, 51, 64  
(b) 8, 32, 34, 51, 64, 21  
(c) 8, 34, 51, 64, 32, 21  
(d) 8, 34, 64, 51, 32, 21

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
d.

2) Consider the following functions

1 point

$$f(n) = 3n\sqrt{n}$$

$$g(n) = 2^{\sqrt{n}\log_2 n}$$

$$h(n) = n!$$

Which of the following is true?

- (a)  $h(n)$  is  $\mathcal{O}(f(n))$   
(b)  $h(n)$  is  $\mathcal{O}(g(n))$   
(c)  $g(n) \neq \mathcal{O}(f(n))$   
(d)  $f(n)$  is  $\mathcal{O}(g(n))$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
d.

3) "Insertion sort is an example of an *incremental* algorithm". This statement is:

1 point

- (a) True  
(b) False

- a.  
 b.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
a.

4) Consider the following two statements

1 point

**Statement 1:** In insertion sort, after  $m$  passes through the array, the first  $m$  elements are in sorted order.

**Statement 2:** And these elements are the  $m$  smallest elements in the array.

Then

- (a) Both the statements are true  
(b) Statement 1 is true but statement 2 is false  
(c) Statement 1 is false but statement 2 is true  
(d) Both the statements are false

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
b.

5) What is the average case time complexity of merge sort?

1 point

- (a)  $\mathcal{O}(n \log n)$   
(b)  $\mathcal{O}(n^2)$   
(c)  $\mathcal{O}(n^2 \log n)$   
(d)  $\mathcal{O}(n(\log n)^2)$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
a.

6) Consider an array of elements  $5, 4, 3, 2, 1$ , what are the steps of insertions done while doing insertion sort in the array.

1 point

- (a)  $(45321) \rightarrow (34521) \rightarrow (23451) \rightarrow (12345)$   
(b)  $(54312) \rightarrow (54123) \rightarrow (51234) \rightarrow (12345)$   
(c)  $(43215) \rightarrow (32154) \rightarrow (21543) \rightarrow (15432)$   
(d)  $(45321) \rightarrow (23451) \rightarrow (34521) \rightarrow (12345)$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
a.

7) How many iteration on an array of size  $N$ , does an insertion sort algorithm consist of?

1 point

- (a)  $N$   
(b)  $N - 1$   
(c)  $N + 1$   
(d)  $N^2$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
b.

8) What is the average case running time of an insertion sort algorithm?

1 point

- (a)  $\mathcal{O}(N)$   
(b)  $\mathcal{O}(N \log N)$   
(c)  $\mathcal{O}(\log N)$   
(d)  $\mathcal{O}(N^2)$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
d.

9) Which of the following is correct with regard to insertion sort?

1 point

- (a) insertion sort is stable and it sorts In-place  
(b) insertion sort is unstable and it sorts In-place  
(c) insertion sort is stable and it does not sort In-place  
(d) insertion sort is unstable and it does not sort In-place

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
a.

10) Assume that a merge sort algorithm in the worst case takes 30 seconds for an input of size 64. Which of the following most closely approximates the maximum input size of a problem that can be solved in 6 minutes?

1 point

- (a) 256  
(b) 512  
(c) 1024  
(d) 2048

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.

Score: 0

Accepted Answers:  
b.