

Unit 13 - Week 11

Course outline

How does an NPTEL online course work?

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Week 11

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- Intuition for 'complexity'
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Assignment 11

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

Due on 2020-04-15, 23:59 IST.

1) A sequence is generated by the recurrence relation $a_{n+1} = ka_n + 8$, where k is a constant. Given $a_1 = 36$ and $a_2 = 20$, find the value of k. 1 point

- $\frac{1}{2}$
 $\frac{1}{3}$
 $\frac{1}{4}$
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\frac{1}{3}$

2) A computer system considers a string of decimal digits valid codeword if it contains an even number of 0 digits. For instance, 1230403 is valid, while 940308605 is not valid. Let a_n be the number of valid n-digit codewords. What is the recurrence relation for a_n ? 1 point

- $a_n = 9 \times 10^n - 8a_{n-1}$, with $a_1 = 9$
 $a_n = 8a_{n-1} + 10^{n-1}$, with $a_1 = 9$
 $a_n = 9a_{n-1} + 10^{n-1}$, with $a_1 = 9$
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $a_n = 8a_{n-1} + 10^{n-1}$, with $a_1 = 9$

3) Consider the following two statements. 1 point

1. $a_n = n^2 + n$ is the solution for the recurrence relation $a_n - a_{n-1} = 2n$, $n \geq 1$ and $a_0 = 0$
2. $a_n = n!$ is the solution for the recurrence relation $a_n = na_{n-1}$, $n \geq 1$ and $a_0 = 1$

- only 1 is true
 Both 1 and 2 are true.
 only 2 is true
 Both 1 and 2 are false.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Both 1 and 2 are true.

4) How many binary strings of length n start with 1 and end with 0? 1 point

- $2^n - 2$
 $2^n - 1$
 2^{n-1}
 2^{n-2}

No, the answer is incorrect.
Score: 0

Accepted Answers:
 2^{n-2}

5) If $u_n = 2u_{n-1} + 3u_{n-2}$, with $n \geq 2$, $u_0 = 0$, $u_1 = 1$, then which of the following is the correct sequence of u_n ? 1 point

- 1, 0, 3, 9, 27, ...
 0, 1, 3, 9, 27, ...
 0, 1, 2, 7, 20, ...
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
0, 1, 2, 7, 20, ...

6) John received 15 rare stamps as a gift from his grandfather, so he decided to start a stamp collection. From the following week onward, John added 3 new stamps to his collection each week. Recurrence relation for the number of stamps in the n^{th} week is 1 point

- $A_n = A_{n-1} - 3$
 $A_n = A_{n-1} + 3A_{n-2}$
 $A_n = A_{n-1} + 3$
 $A_n = A_{n-1} - 3A_{n-2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $A_n = A_{n-1} + 3$

7) For the sequence $a_n = 9 + 4n^2$, a_5 is: 1 point

- 21
 89
 91
 109

No, the answer is incorrect.
Score: 0

Accepted Answers:
109

8) Let $y_0, y_1, y_2, y_3 \dots$ be defined by the formula $y_n = 2^n - 1$ for all integers $n \geq 0$. The recurrence relation for this sequence is: 1 point

- $y_n = 2y_{n-1} + 1$
 $y_n = 2y_{n-1} - 1$
 $y_n = y_{n-1} + 1$
 $y_n = 2y_{n-1} + 2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $y_n = 2y_{n-1} + 1$

9) Which of the following is the solution to the recurrence relation $u_n = u_{n-1} + n$, $n \geq 1$ and $u_0 = 4$? 1 point

- $u_n = 4 + \frac{n(n+1)}{2}$
 $u_n = 4 - \frac{n(n+1)}{2}$
 $u_n = 4 + \frac{n(n-1)}{2}$
 $u_n = 4 - \frac{n(n-1)}{2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $u_n = 4 + \frac{n(n+1)}{2}$

10) A sequence of numbers u_1, u_2, u_3, \dots is defined as $u_{n+1} = 3u_n + 1$, where $u_1 = \frac{1}{2}$. The solution of this recurrence relation is: 1 point

- $u_n = 2 \times 3^n - 1$
 $u_n = 3^n - \frac{1}{2}$
 $u_n = 3^{n-1} - \frac{1}{2}$
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $u_n = 3^{n-1} - \frac{1}{2}$