Unit 13 - Week 11

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 ... 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 , ... 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:
$u_n = 3^{n-1} - \frac{1}{2}$