Course is completed. The course result can no longer be changed.

Solving Recurrence Relations

PREVIOUS NEXT

Quiz

Bookmark this page

Now, it's time for a short quiz to recap what you've learned. The quiz is **graded**, so you can take it only once. Each question will be followed by feedback explaining why your answer is right or wrong. If your answer is incorrect, you will see a suggestion of what you might need to refresh your memory.

Good luck!

*Read the question below and select **all** the answers that are correct. Then, click "Submit."*

Which TWO of the following are non-linear recurrence relations?

- [ ] $a_n = a_{n-1} + a_{n-2} + 10, \; a_1 = 100, \; a_2 = 210$
- [x] $a_n = a_{n-1}^3 + a_{n-2}^2 + 10, \; a_1 = 100, \; a_2 = 210$
- [ ] $a_n = a_{n-1} + a_{n-2} + 10n, \; a_1 = 100, \; a_2 = 210$
- [x] $a_n = a_{n-1} + a_{n-2} + \ln\left(a_{n-2}\right) + 10n, \; a_1 = 100, \; a_2 = 210$

✔

Correct: Yes, b and d are non-linear recurrence relations.

Submit You have used 1 of 1 attempt

Read the question below and select the correct answer. Then, click "Submit."

First, classify each recurrence relation below as "l" or "n," where "l" means a linear relation with constant coefficients and "n" means a **non**-linear relation with constant coefficients. Then, according to this classification, select the correct sequence below.

a) $a_n = \ln\left(a_{n-1}\right) + a_{n-2} + 10\ln\left(n\right), \; a_1 = 100, \; a_2 = 210$
b) $a_n = n \cdot a_{n-1} + k \cdot a_{n-2} + 10n^5, \; a_1 = 100, \; a_2 = 210$
c) $a_n = 8a_{n-3} + 4a_{n-1} + 2a_{n-2} + 3n^2, \; a_1 = 100, \; a_2 = 210, \; a_3 = -1$
d) $a_n = n^2 \cdot a_{n-1} + 5a_{n-2} + 10n, \; a_1 = 100, \; a_2 = -1$

- ( ) l, n, l, n
- ( ) n, n, n, n
- (•) n, n, l, n
- ( ) l, l, l, l
- ( ) n, l, n, l

✔

Correct: There is one linear recurrence relation with constant coefficients: c).

Submit You have used 1 of 1 attempt

Read the question below and select the correct answer. Then, click "Submit."

Read the question below and select the correct answer. Then, click "Submit."

When is the linear recurrence relation $a_k + C_1 a_{k-1} + C_2 a_{k-2} + \ldots + C_n a_{k-n} = f(k)$ for $k \geq n$ with constants $C_1, C_2, \ldots, C_n$ homogeneous?

- When $f(x) = 0$
- When $f(x)$ is not 0
- When $C_i = 1$ for $each$ i $from$ 1 to n
- When $C_i\ ! = 0$ for $each$ i $from$ 1 to n

Correct: Well done!

Submit You have used 1 of 1 attempt

Read the question below and select the correct answer. Then, click "Submit."

Please, find the solution in general form to the linear homogeneous recurrence relation below.

$$a_n - 3a_{n-1} - 4a_{n-2} = 0,\ a_{1=} - 3,\ a_2 = 17$$

Note: You don't need to find the value of the coefficients α and β to select the correct option, but it might be helpful to find it to check your solution.

- $a_n = \alpha \cdot 1^n + \beta \cdot 4^n$
- $a_n = \alpha \cdot (-1)^n + \beta \cdot 4^n$
- $a_n = \alpha \cdot 1^n + \beta \cdot (-4)^n$
- $a_n = \alpha \cdot (-2)^n + \beta \cdot (-4)^n$
- $a_n = \alpha \cdot (-1)^n + \beta \cdot (-4)^n$

Correct: The characteristic equation and its roots are:

$$\begin{aligned} x^2 - 3x - 4 &= 0 \\ x_1 = -1, x_2 &= 4 \end{aligned}$$

The solution will be presented in the following form (general solution):

$$a_n = \alpha \cdot (-1)^n + \beta \cdot 4^n$$

Submit You have used 1 of 1 attempt

Read the question below and select the correct answer. Then, click "Submit."

Find the solution in general form to the linear homogeneous recurrence relation below.

$$a_n - 4a_{n-1} + 4a_{n-2} = 0,\ a_1 = 17,\ a_2 = 116$$

Note: You don't need to find the value of the coefficients α and β to select the correct option, but it might be helpful to find it to check your solution.

- $a_n = \alpha * 2^n$
- $a_n = \alpha * 2^n + \beta \cdot n$
- $a_n = \alpha \cdot n \cdot 2^n + \beta \cdot n^2 \cdot 2^n$
- $a_n = \alpha * 2^n + \beta * n \cdot 2^n$
- $a_n = \alpha \cdot n \cdot 2^n + \beta \cdot n \cdot 2^n$

Correct: The characteristic equation and its roots are:

$$\begin{aligned} x^2 - 4x + 4 &= 0 \\ x_1 = 2,\ x_2 &= 2 \end{aligned}$$

The solution will be presented in the following form (general solution):

$$a_n = \alpha * 2^n + \beta * n \cdot 2^n$$

Submit You have used 1 of 1 attempt

Read the question below and select the correct answer. Then, click "Submit."

What is the characteristic equation for the following recurrence relation?

$$a_n + a_{n-1} + 3 \cdot a_{n-2} + 3 \cdot a_{n-3} - a_{n-4} = 0$$

- (selected) $x^4 + x^3 + 3x^2 + 3x - 1 = 0$
- $x^5 + x^4 + 3x^3 + 3x^2 - x = 0$
- $x + x^2 + 3x^3 + 3x^4 - x^5 = 0$
- $1 + x + 3x^2 + 3x^3 - x^4 = 0$

Correct: The characteristic equation for the given recurrence relation is:

$$x^4 + x^3 + 3x^2 + 3x - 1 = 0$$

Submit You have used 1 of 1 attempt

Read the question below and select the correct answer. Then, click "Submit."

What is the characteristic equation for the recurrence relation below?

$$-2a_n + 6a_{n-1} + 3a_{n-2} + 3a_{n-3} = 0$$

- $-2x^4 + 6x^3 + 3x^2 + 3x = 0$
- $-2x + 6x^2 + 3x^3 + 3x^4 = 0$
- $-2 + 6x + 3x^2 + 3x^4 = 0$
- (selected) $-2x^3 + 6x^2 + 3x + 3 = 0$

Correct: The characteristic equation for the given recurrence relation is:

$$-2x^3 + 6x^2 + 3x + 3 = 0$$

Submit You have used 1 of 1 attempt

PREVIOUS NEXT

© All Rights Reserved

© 2025 EPAM Systems, Inc. All Rights Reserved