Recurrence Relations I

- **วิชชาภัทร จินดานาถ** previously submitted answers to this quiz/test on 27-Oct-2023 @ 02:16:58 and obtained **15** correct answers out of **16** .
- This test/quiz can be taken many times.
- Correct answers will NOT be revealed after submission.

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1 Let the recurrence relation a_n be the number of ways to climb n stairs if the person climbing the stairs can take one, two, or four stairs at a time ($n \geq 1$). Given a_n is in the form of $a_n = Aa_{n-1} + Ba_{n-2} + Ca_{n-3} + Da_{n-4}$ where $n \geq 5$, find A, B, C, and D respectively.

From previous attempt

0, 1, 1, and 1

1, 0, 1, and 1

1, 1, 0, and 1

1, 1, 1, and 0

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2 From a_n got in the question 1, find a_1, a_2, a_3, and a_4 respectively (which are the initial conditions).

From previous attempt

1, 2, 3, 6

1, 2, 4, 8

1, 1, 4, 6

1, 1, 3, 8

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3 From a_n got in the question 1, find the degree of a_n.

1 From previous attempt

3

4

5

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4 Let the recurrence relation a_n be the number of bit strings of length n that **DO NOT** contain 00 ($n \geq 0$). Given a_n is in the form of $a_n = Aa_{n-1} + Ba_{n-2} + Ca_{n-3} + Da_{n-4}$ where $n \geq 3$, find A, B, C, and D respectively.

From previous attempt

0, 0, 1, 1

0, 1, 0, 1

1, 0, 1, 0

1, 1, 0, 0

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5 From a_n got in the question 4, find a_0, a_1, and a_2 respectively (which are the initial conditions).

1, 1, 2 From previous attempt

1, 2, 3

2, 1, 3

2, 2, 4

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6 From a_n got in the question 4, find the degree of a_n.

1 From previous attempt

2

3

4

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7 A recurrence relation for the number of ways to completely cover a $2 \times n$ checkerboard with 1×2 dominoes is $a_n = Aa_{n-1} + Ba_{n-2} + Ca_{n-3}$

From previous attempt

[Hint: Consider separately the coverings where the position in the top right corner of the checkerboard is covered by a domino positioned horizontally and where it is covered by a domino positioned vertically.]

Find (A, B, C)

(1,0,1)

(1,1,0)

(0,1,1)

(1,1,1)

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8 Find (a_1, a_2) for the recurrence relation in problem 7 [Find the initial conditions]

From previous attempt

(0,2)

(1,2)

(0,1)

(1,1)

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9 How many ways are there to completely cover a 2×17 checkerboard with 1×2 dominoes?

From previous attempt

1596

1597

2584

4180

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10 A recurrence relation for the number of ways to lay out a walkway with slate tiles if the tiles are red, green, or gray, so that no two red tiles are adjacent and tiles of the same color are considered indistinguishable is $a_n = Aa_{n-1} + Ba_{n-2}$ From previous attempt

Find (A, B)

(0,2)

(2,1)

(2,2)

(3,-1)

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11 Find (a_0, a_1) for the recurrence relation in problem 10 [Find the initial conditions]

(0,3) From previous attempt

(3,8)

(1,3)

(1,8)

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12 How many ways are there to lay out a path of seven tiles as described in problem 10?

448 From previous attempt

696

1224

3344

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13 String of decimal digits is a valid codeword if it contains an even number of 0 digits e.g. 100230290 is valid.

Let a_n be the number of valid n - digit codewords. From previous attempt

Find a_1

8

9

10

0

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14 String of decimal digits is a valid codeword if it contains an even number of 0 digits e.g. 100230290 is valid.

Let a_n be the number of valid n - digit codewords.

From previous attempt

Recurrence relation for a_n is in the form of $a_n = Aa_{n-1} + Ba_{n-2} + C^{n-1}$

Find A, B, and C respectively.

8, 0, 10

1, 0, 2

2, 3, 1

5, 1, 8

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15 The recurrence relation satisfied by an where an is the number of regions that a plane is divided into by n lines, if no two of the lines are parallel and no three of the lines go through the same point, is in the form of $a_n = Aa_{n-1} + Ba_{n-2} + Cn$

From previous attempt

Find a_1

3

1

2

4

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16 The recurrence relation satisfied by an where an is the number of regions that a plane is divided into by n lines, if no two of the lines are parallel and no three of the lines go through the same point, is in the form of $a_n = Aa_{n-1} + Ba_{n-2} + Cn$

From previous attempt

Find A, B, and C respectively

1, 0, 2

1, 0, 1

2, 1, 0

1, 1, 1

Submit

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