

Problem Session #8

Instructor: Dr. Zafeirakis Zafeirakopoulos*Assistant:* Gizem Süngü**Problem 1: Recurrence Relation**

(0 points)

Find a recurrence relation and initial conditions for 1,5,17,53,161,485...

$$a_0 = 1, a_n = 3 \times a_{n-1} + 2$$

Problem 2: Recurrence Relation

(0 points)

Find a recurrence relation and initial conditions for 1,3,7,15,31,63...

$$a_0 = 2^0 = 1, a_n = 2^n - 1$$

Problem 3: Recurrence Relation

(0 points)

Check that $a_n = 2^n + 1$ is a solution to the recurrence relation $a_n = 2a_{n-1} - 1$ with $a_1 = 3$.

$$a_{n-1} = 2^{n-1} + 1$$

$$a_n = 2 \times (2^{n-1} + 1) - 1 = 2 \times 2^{n-1} + 2 - 1 = 2^n + 1$$

Problem 4: Recurrence Relation

(0 points)

Solve the recurrence relation $a_n = a_{n-1} + n$ with initial condition $a_0 = 4$.

$$a_1 = a_0 + 1 = 5$$

$$a_2 = a_1 + 2 = 7$$

$$a_3 = a_2 + 3 = 10$$

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$$a_n = a_{n-1} + n$$

$$a_n = a_0 + \frac{n(n+1)}{2} = 4 + \frac{n(n+1)}{2}$$