1. Assume we have the following sequence of numbers:
3, 5, 7, 9, 11, 13, 15, ... Can we determine a general term of the sequence \( a_k \)?

Note: \( a_1 = 3, a_2 = 5, ... \)

These are odd integers: recall the definition of odd integers:
"an integer \( m \) is odd if \( m = 2k+1 \) for any integer \( k \). \( a_k = 2k+1 \) for all integers \( k \geq 1 \)

2. Write the first four terms of the following sequence: First four terms: \( k= 1, 2, 3, 4 \)

\[ a_k = \frac{k}{10+k}, \forall \text{ integers } k \geq 1 \]

\[ a_1 = \frac{1}{10+1} = \frac{1}{11} \]

\[ a_2 = \frac{2}{10+2} = \frac{2}{12} = \frac{1}{6} \]

\[ a_3 = \frac{3}{10+3} = \frac{3}{13} \]

\[ a_4 = \frac{4}{10+4} = \frac{4}{14} = \frac{2}{7} \]

3. Determine whether the sequence \( a_n = 3n \) is a solution of the recurrence relation
\( a_n = 2a_{n-1} - a_{n-2} \) for \( n \geq 2 \)

\( a_{n-1} = 3(n-1) = 3n - 3 \)

\( a_{n-2} = 3(n-2) = 3n - 6 \)

\[
2a_{n-1} - a_{n-2} = 2(3n - 3) - 3n - 6 \\
= 3n \\
= a_n
\]

Therefore, the sequence \( a_n = 3n \) is a solution of the recurrence relation.

4. Determine whether the sequence \( a_n = 2^n \) is a solution to the recurrence relation
\( a_n = 2a_{n-1} - a_{n-2} \) for \( n \geq 0 \)

\( a_{n-1} = 2^{n-1} \)

\( a_{n-2} = 2^{n-2} \)

\[
2a_{n-1} - a_{n-2} = 2(2^{n-1}) - 2^{n-2} \\
= 2^n - 2^{n-2} \\
= 2^n (1 - 2^{-2}) \neq a_n
\]

Therefore, the sequence \( a_n = 3n \) is not a solution of the recurrence relation.