1. (4 points) Find the sum of the first 20 terms of the arithmetic sequence

\[ a_1 = 1, \quad a_2 = 5, \quad a_3 = 9, \quad a_4 = 13, \quad \ldots. \]

2. (4 points) Solve the recurrence relation

\[ a_0 = 2, \quad a_1 = 3, \quad a_n = 6a_{n-1} - 9a_{n-2} \quad (n \geq 2). \]
3. (7 points) Use induction to prove that for every integer \( n \geq 2 \), we have

\[
\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots + \frac{1}{n^2} < 2 - \frac{1}{n}.
\]