1. Suppose that \( b_1 = 1 \) and \( b_{n+1} = 3b_n + 1 \) for \( n \geq 1 \).
   
   Show that, if \( b_n = \frac{3^n - 1}{2} \), then \( b_{n+1} = \frac{3^{n+1} - 1}{2} \).

2. Suppose that \( a_1 = 2 \) and \( a_{n+1} = a_n + 2n \) for \( n \geq 1 \).
   
   Then, \( a_1 = 2, a_2 = a_1 + 2(1) = 4, a_3 = a_2 + 2(2) = 8 \).
   
   Is it correct that \( a_n = 2^n \)?

3. Prove by the Principle of Mathematical Induction that
   
   \[
   1 + 2 + 2^2 + \cdots + 2^n = 2^{n+1} - 1 .
   \]

4. Write out the full binomial expansion of \((3a - 4b)^6\).

5. What is the coefficient of \( x^0 \) in the binomial expansion of \( \left( 2x^2 - \frac{3}{x^3} \right)^{30} \)?