1. (15 Marks) How many ways can you divide \( n \) identical chocolates among \( k \) children such that each gets at least 2?

2. (20 Marks) How many functions \( f \) are there from \( \{1, \ldots, n\} \) to \( \{-1, 0, 1\} \) such that there exists at least one \( i \in \{1, \ldots, n\} \) where \( f(i) = 0 \).

3. (20 Marks) If \( T(n) = T(n/3) + 15 \) and \( T(1) = 0 \) then guess the expression of \( T(n) \). (Assume that \( T(n) \) is a power of 3.)

4. (15 Marks) Give a closed form expression of \( 1 + \binom{n}{1}2 + \binom{n}{2}4 + \cdots + \binom{n}{n}2^n \).

5. (15 Marks) If \( T(n) = T(n - 1) + n \) prove that \( T(n) = n(n + 1)/2 \).

6. (15 Marks) Prove the following statement: \( 2^2 + 5^2 + 8^2 + \cdots + (3n + 1)^2 = \frac{1}{2}n(6n^2 + 3n - 1) \)

7. (15 Marks) Prove that for all integer \( n \geq 3 \), \( n^2 - 7n + 12 \geq 0 \).