Problem A1. Find the sum \( \sum_{k=0}^{n} (3k(k + 1) + 1) \), for \( n \geq 1 \).
Problem A2. Given a fix positive integer \( n \), find the minimum value of the following function:

\[
f(x) = x^n + x^{n-2} + x^{n-4} + \cdots + \frac{1}{x^{n-4}} + \frac{1}{x^{n-2}} + \frac{1}{x^n}
\]

for \( x > 0 \).
Problem A3. On a large, flat field, $n$ people ($n > 1$) are positioned so that for each person the distances to all the other people are different. Each person holds a water pistol and at a given signal fires and hits the person who is closest. When $n$ is odd, show that there is at least one person left dry.
Problem A4. $\mathbb{R}$ is the set of real numbers. For what $k \in \mathbb{R}$ can we find a continuous function $f : \mathbb{R} \to \mathbb{R}$ such that

$$f(f(x)) = kx^9$$

for all $x \in \mathbb{R}$. 
Problem A5. Show that for any positive integer $n$, there exists a positive multiple of $n$ that contains only the digits 7 and 0.
Problem A6. Let $u_n$ be the number of symmetric $n \times n$-matrices whose elements are all 0’s and 1’s with exactly one 1 in each row. Let $u_0 = 1$. Prove that

$$u_{n+1} = u_n + nu_{n-1}$$

and

$$\sum_{n=0}^{\infty} \frac{u_n x^n}{n!} = e^{x + x^2/2}.$$