Problem 1. Suppose that $P(n)$ is a sentence that depends on an integer n. If you can prove that, for all integers n, the sentence $P(n)$ implies $P(n+1)$ then you can deduce that $P(n)$ is true for all values of n.
A) True B) False

Problem 2. Every nonempty set of positive rational numbers has a least element.
A) True B) False

Problem 3. Let n be a positive integer. For every positive integer m there is exactly one integer r with $0 \le r < n$ such that $m \equiv r \pmod{n}$.
A) True B) False

Problem 4. The division algorithm says that if n is a positive integer then every other integer m can be written as $qn + r$ where q and r are integers and $0 \le r < n$. Prove the division algorithm by induction.

Problem 5. Prove the binomial theorem $(x+y)^n = \sum_{k=0}^{n} \binom{n}{k} x^{n-k} y^k$ using induction.

Problem 6. Find a formula for the first n consecutive cubes

$$1 + 2^3 + 3^3 + 4^3 + \cdots + n^3$$

and prove it by induction.