Practice Problems: Proof by induction

1. Prove: 1+2+3+4+5+...+ n = (1+n)n/2
2. Show that for all integers greater than zero: $2^n >= n+1$
3. Prove by induction that $1 + 3 + 5 + 7 + ... + (2n-1) = n^2$
4. Prove by induction that $1^2 + 2^2 + 3^2 + ... + n^2 = (1/6)\ n(n+1)(2n+1)$
5. Prove that for any positive integer number n, $n^3 + 2n$ is divisible by 3

Practice Problems: Proof by Counter Example

Prove that the following statements are false by Counter Example:

1. "If n is an integer and n^2 is divisible by 4, then n is divisible by 4."
2. "If n is prime, then 2^n-1 is prime."
3. "x^2-x+5 is prime for every x, where x is an integer."