

Prove the following statements.

1. No perfect square has a last digit of 7.
2. For all integers m and n , $4 \mid (m^2 - n^2)$ if and only if m and n have the same parity (i.e. both even or both odd).
3. For any real numbers x and y , $||x| - |y|| \leq |x - y|$.
4. For any natural number n , $1 + 4 + 7 + \cdots + (3n - 2) = \frac{n(3n-1)}{2}$.