

Proof

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Proof by Deduction

This is the most direct proof - generally using algebra - to prove it for all cases.

Example 1

Prove that the sum of four consecutive integers is even.

$(n) + (n + 1) + (n + 2) + (n + 3) = 4n + 6 = 2(2n + 3) \Rightarrow$ The sum is even.

Proof by Exhaustion

Example 2

No square number ends in 2.

Only need to look at unit digit.

None of their squares end in 2 \Rightarrow No square number ends in 2.

Disproof by Counter Example

We find an example that breaks the rule.

The values of $n^2 + n + 41$ is prime.

Let $n = 41$

$$= 41^2 + 2 \times 41$$

$$= 41(41 + 2)$$

$$= 41 \times 43$$

\Rightarrow Not prime