Guide to: Algebraic proof

maths Links

Explanation:

Never use numerical examples to prove an algebraic statement—you must use general algebra for any integer **n**: an **even number is 2n**, an **odd number is 2n + 1**, consecutive integers are **n, n + 1, n + 2**, and consecutive odd numbers are **2n + 1, 2n + 3**.

Expand and simplify the expression, then **factorise out the required multiple** (e.g. write 8n + 4 as 4(2n + 1) to prove it is a multiple of 4) and finish with a concluding sentence explaining why the result holds for all integers n.

Example 1: Prove algebraically that the difference between the squares of any two consecutive odd numbers is always a multiple of 8.

Solution:

Let the consecutive odd numbers be **2n + 1** and **2n + 3**:

$(2n + 3)^2 - (2n + 1)^2 = (4n^2 + 12n + 9) - (4n^2 + 4n + 1)$
$= 8n + 8 =$ **$8(n + 1)$**

Since n + 1 is an integer, 8(n + 1) is always a multiple of 8.

Example 2: Prove that $n^2 - 6n + 13$ is positive for all real values of n.

Solution:

Complete the square on $n^2 - 6n + 13$:

$= (n - 3)^2 - 9 + 13 =$ **$(n - 3)^2 + 4$**

Since any squared real number is ≥ 0, $(n - 3)^2 \geq 0$

Therefore $(n - 3)^2 + 4 \geq 4 > 0$, so it is always positive.

Worksheets and other links					
Video Lesson on this topic	Video		**Naiker Maths**	Qs	Ans
Ken Stafford (Past Paper Qs)	Qs	Ans	**Dr Austin Maths**	Qs	Ans
Maths Genie	Qs	Ans	**Maths Made Easy**	Qs	Ans
Corbettmaths (Practice)	Qs	Ans	**Maths4Everyone**	Qs	Ans
Corbettmaths (Textbook)	Qs	Ans	**Metatutor**	Qs	Ans
1st Class Maths	Qs	Ans	**Maths Takeaway**	Qs	Ans

Questions by topic

Past Papers

Maths worksheets

Buy workbook

Quizzes

More resources like this

ken@mathslinks.co.uk