AH Proof by Induction.notebook

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Proof by Induction

Proving by induction is proving a statement or theorem by a process of ordered steps. It gives us a method of proof for a result which seems to be true.

To prove by induction:

- We first prove that a statement is true for a positive integer value of n e.g. n = 1
- We then check the statement for n = k and assume true.
- We then prove that the theorem is true for n = k + 1 by using the assumption from 2. This will confirm it to be correct.

The conclusion is that if the theorem is true for n = k, then it must be true for n = k + 1 but since it's true for n = 1, then by induction it is true for all positive integers n.

We then pro

Proof by Induction

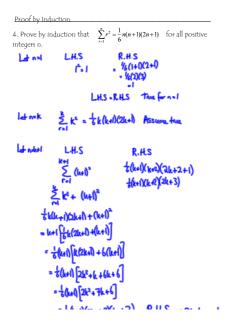
2. Prove that n^2 + 3n is divisible by 2 for all $n \in N$

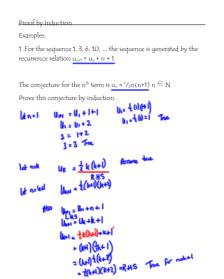
ld n=1 = 1°+30) = 4 cullich is divisible by 2 thurefore true.

let n=k k2+3k assume true. So us let k2+3k=2m (2m represents a number that is divisible by all multiples of 2).

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 \begin{array}{c} \mbox{lof } n=k+1 & (k+1)^2+3(k+1) \\ & \mbox{$k^2+2k+1+3k+3$} \\ & \mbox{$k^2+3k+2k+4$} \\ & \mbox{$2m+2k+4$} \\ & \mbox{$2m+2k+4$
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The statement is true for netw, therefore true for n=1+1 and since true for n=1, true true for all NEN.
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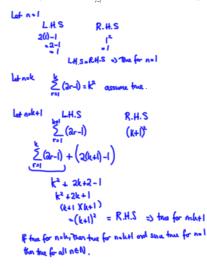




Since true for n = k, true for n = k + 1 and true for n = 1 then true for all n≥ 1, n \in N.

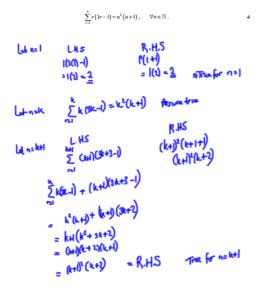
Proof by Induction

3. Prove by induction that $\sum_{n=1}^{n} (2r-1) = n^2$ for all positive integers n.



Proof by In	duction
5. Given z =	$\cos \theta$ + $i \sin \theta$ prove by induction that $z^n = \cos \theta$ + $i \sin n \theta$
Letn-1	21 = cos0+1510 => There for not
lat role	2 ^k = cosk+ 1 sink9 assume true
let n=k+l	L.H.S R.H.S Z ^{bei} (cs(k+i)0+(5h(k+1)0
Coskecose Coskecose	$\mathbb{Z}^k : \mathbb{Z}^l$ ++Isink@)(cos0+isin@) + cosle@isin@+Isink@cos@+ [sink@sin@ 9-sink@sin@ + I(cosle@sin@ + sink@cos@) 0+0) + isin(k@+0) u+1)@ + isin(k@+0) u+1)@ + isin(k@+0) = R.H.S True for n= k+1
	for nucle that for neutral and since two for null, we for add nutle.

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If true for n = k, then true for n = k + 1 and since true for n = 1



If true for n = k, then true for n = k + 1 and since true for n = 1, then true for all n E N.