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| **Literacy**Induction, proof, assumption, inductive hypothesis, principle. | **Research****Proof by Induction Homework**Research and write a paragraph about the history of mathematical induction. | **Memory**4 steps for an induction proof:1. Check the base case.
2. Assume true for some n = k.
3. Show that if it holds for n = k it does for n = k+1 too.
4. Conclude
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| **Skills**1. Prove that $n^{3}-7n+3 $is divisible by 3 for any non-negative integer.
2. Prove that $1+3+5+…+\left(2n-1\right)=n^{2}$ for all positive integer $n$.
3. Prove that $n!<n^{n}$ for any integer $n>1$.
4. Prove by induction, that if $u\_{n+2}=5u\_{n+1}-6u\_{n}$ with $u\_{1}=1 $and $u\_{2}=5$, then $u\_{n}=3^{n}-2^{n}$
5. For the matrix $A= \left(\begin{matrix}9&16\\-4&-7\end{matrix}\right)$ prove by induction that $A^{n}= \left(\begin{matrix}8n+1&16n\\-4n&1-8n\end{matrix}\right)$.
 | **Stretch**Prove the following for all positive integers, when $x\ne 1, -1$$$\sum\_{i=1}^{n}\frac{x^{2^{i-1}}}{1-x^{2^{i}}}= \frac{1}{1-x}- \frac{1}{1-x^{2^{n}}}$$ |