

HOW TO DO A PROOF!

1. Ask: have I seen something like this before ? Possibly in a different setting ?
- (ii) When you can't see the general case with $k = n$, try a small case with $k = 2$ or 3 or with small numbers.
- (iii) Ask, if you don't understand the question. If you do not, it is assumed that you do! (= default setting!)
- (iv) Make a data box and check each piece of data that was used.
At any stage, see what data is left and try to (i.e. you must!) use (some of) it in your next step. If any data is left at the end, you make a mistake! (assuming the question was right)
- (v) Do not use any data that is not given. For example don't use logs or n -th roots in group calculations.
- (vi) Start with the most basic facts that the data gives you, for example if your question involved max/min use $\min(a,?) \leq a \leq \max(a,?)$ for any ?
- (vii) Look through other books for ideas or examples
- (viii) See where you are and where you want to go, i.e. clearly state: Given ... To Prove ... and then start with the input.
- (ix) Do not use the answer in proving your result
- (x) Ask if induction is needed/possible ?
- (xi) Ask if you should use a proof by contradiction ?
- (xii) Often its easier to use the CONTRA-POSITIVE of what you are asked to prove. See which is easier.
- (xiii) Clearly show BOTH WAYS (i.e. implications) in your proof. Usually one way is easy while the other may be much harder.
- (xiv) Do not prove the the REVERSE of what you are trying to show. Yet, looking at the REVERSE process may give some insight into what is going on.
- (xv) Do not invent fairy tales. Each step should be "water tight"
- (xvi) Look/read through your notes for examples that are similar
- (xvii) When you are done, ask: can I shorten/steamline/improve on my proof ?
- (xviii) When you are done ask: what is the significance of my proof ?