Instructions

Do the Thinking Land and proof scratch draft of your group's Theorem on the your groups's AWW board. Then submit a group Latexed final version of your proof. Each group member is to fill in their group number on Bb's GW 4.PMI (under Group Work Homework) in the white comment box (so I can assign grades). One submission per group by the group's designated group submitter is sufficient as long as each group member's PIN is on the one submission; thus, write your PIN on your AWW Board.

Induction (start-at-$n_0 \in \mathbb{Z}$/extended/generalized form)

§4.2 p190

Fix $n_0 \in \mathbb{Z}$.
If

BASE STEP: $P(n_0)$ is true
INDUCTIVE STEP: for each $n \in \mathbb{Z}^{\geq n_0}$: $\underbrace{[\ P(n) \text{ is true }]}_{\text{inductive hypothesis}} \implies \underbrace{[\ P(n+1) \text{ is true }]}_{\text{inductive conclusion}}$

then $P(n)$ is true for each $n \in \mathbb{Z}^{\geq n_0}$.

Math Induction Writing Guidelines

When writing an induction proof, remember to *keep your reader informed*; thus, you should:

(1) say what you are trying to show inductively
(2) say what your induction variable is (e.g., if you are trying to show $(\forall j \in \mathbb{N})\,[P(j)]$ then say: We will show that *blub* holds for each $j \in \mathbb{N}$ by induction on j.)
(3) indicate where your base step begins
(4) indicate where your base step ends
(5) indicate where your inductive step begins
(6) clearly state your inductive hypothesis (IH)
(7) clearly state your inductive conclusion (IC)
(8) indicate where your inductive step ends.

As with any proof, clean up your *Thinking Land*:

(9) do NOT pull your reader through the mud with you
new (10) on the base step confirm only the cases of n (or whatever letter you call you inductive variable) that you need to show (no more and no less).

Hints

Note in new item (10) in the above "Math Induction Writing Guidelines".

In an induction problem involving an (in)equality, when showing that the inductive hypothesis (IH) implies the inductive conclusion (IC), when beginning with the (IC), often it is a good first try to start on the side of the (in)equality of the (IC) which can be easily manipulated as to apply the (IH).

►. Use Math Induction (start-at-$n_0 \in \mathbb{Z}$/extended/generalized form) to show your group's exercise.

Group 1. AWW Board Link . Show that for $n \in \mathbb{N}$ with $n > 4$

$$n^2 < 2^n \ .$$

Group 2. AWW Board Link . Show that for $n \in \mathbb{N}$ with $n \geq 5$

$$2^{n+3} < (n+1)! \ .$$

Group 3. AWW Board Link . Show that for $n \in \mathbb{N}$ with $n \geq 2$

$$\prod_{i=2}^{n} \frac{i^2-1}{i^2} = \frac{n+1}{2n} \ .$$