Miscellaneous

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Contents

1 Abstract

This is a place with random notes and stuff I have yet to put in its place.

1.1 Exercises

Prove $n! > n^2$ for $n \geq 4$.

The base case is $4! = 24 > 4^2 = 16$.

The induction step is to prove $n! > n^2 \implies (n+1)! > (n+1)^2$. Note that $(n+1)! = (n+1)n!$. Since $n! > n^2$, then

$$n!(n+1) > n^2(n+1)$$
$$n!(n+1) > n^3 + n^2$$

Since $n \geq 4$, $n^3 + n^2 > (n+1)^2 = n^2 + 2n + 1$. Thus, by the transitive property, $(n+1)! > (n+1)^2$.