**Announcements**

- Test: today → Wed @ 6 pm
- Where was Prof K.
- Kappa
- Reflections (No style of proof given)
- Quiz

<table>
<thead>
<tr>
<th>Chris</th>
<th>Joonwoo</th>
<th>Galen</th>
<th>Grant</th>
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<tr>
<td>Jack</td>
<td>Laura</td>
<td>Christan</td>
<td>Kai</td>
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<td>Anna</td>
<td>Alex F</td>
<td>Pierce</td>
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<td>Brooks</td>
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<td>Alex B</td>
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<td>Ben</td>
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<td>Emma</td>
<td>Hannah</td>
<td>Kieran</td>
<td>Matt</td>
<td>Peter</td>
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<td>Elva</td>
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<td>Elita</td>
<td>Farhan</td>
<td>Jacqueline</td>
<td>Trey</td>
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**Strong Induction** - when to use

*Quiz:*
- Whenever use inductive assumption, need to explain why you are lower on ladder.
  - If assume \( P(r) \) is true \( \forall r \in \mathbb{Z}, 2 \leq r \leq k \), need to show instance is between 2 & k.
- Readability "Using the inductive assumption"

**Counting Tricks** (worksheet was challenge)
- "or" \( \rightarrow \) sum rule
- "and" \( \rightarrow \) product rule
- Make this choice then make this choice \( \rightarrow \) product rule
  - \( \uparrow \) order matters

\[ \binom{6}{2} \times \binom{4}{2} \] incorrect

\[ \binom{2}{1} \times \binom{2}{1} \] if
because saying the order in which you pick pairs matters
• If order matters, use permutation

• Check for overcounting: can you get the same result 2 ways

• "At least 3" = 3 or 4 or 5 = sum rule

• K positions in string of length n: \( \binom{n}{k} \)

\[
\begin{array}{c}
\text{DDDDD same DDDD} \\
\uparrow \quad \uparrow \quad \uparrow \quad \uparrow \quad \uparrow \\
\text{1st} \quad 2nd \quad 3rd \quad 4th \quad 5th
\end{array}
\]

• Best... Practice!

• Do small examples

• Several ways to solve!
Big-O questions

Not intersection:

\[
\sin(x) \leq 1 \text{ for all } x \geq 0 \\
\sin(x) = O(1)
\]

(Change of base formula OK)

Graph search \(\rightarrow\) PA

Contradiction/Induction questions

Want to prove: \(P \rightarrow Q\)

Assume for contradiction: \(P \land \neg Q\) 7.5.3