# Announcements

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

Chris          Joonwoo          Galen          Grant
Jack           Laura            Christian      Kai
Anna           Alex F           Pierce         Ursula

Brooks         Eric             Alex B         Jackson
Ben            John             Gabby          Corinne
Noah           Graham           Hamilton       William

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Chris          Jacob            Lucy           Miles          Annica
Emma           Hannah           Kieran         Matt           Peter
Sam            Asra             Lilly          Arden          Laura

Nicole         Angel            Andrew         Asher
Elva           Nadani           Abigail        Elie
Eliza          Farhan           Jacqueline     Trey

# 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 betwee 2 & K.
- Readability "Using the inductive assumption"

# Counting Tricks (worksheet was challenge)
- "or" → Sum rule
- "and" → product rule
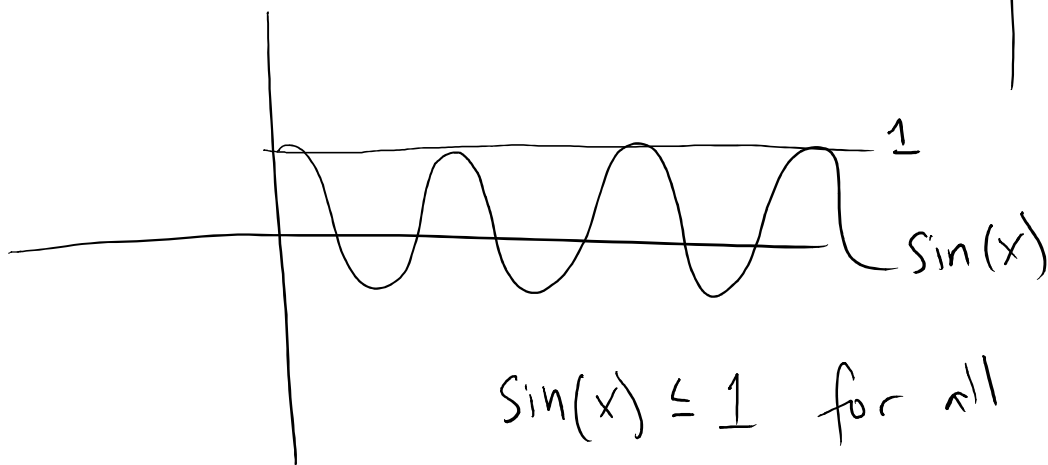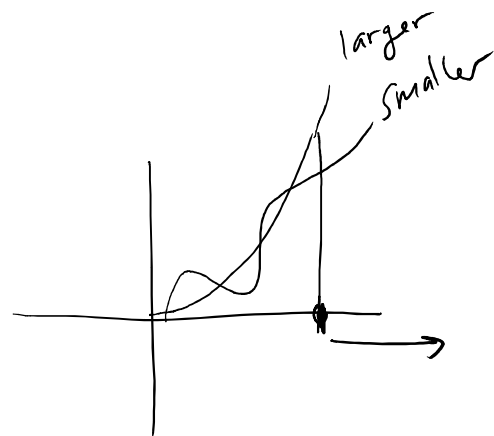- Make this choice then make this choice → product rule
  $\uparrow$
  order matters

- "and" → product rule
- series of steps: Make this choice then make this choice → } product

$$\begin{array}{cccc} a & c & e \\ \bullet & \bullet & \bullet \\ \\ b & d & f \\ \bullet & \bullet & \bullet \end{array}$$

$\binom{6}{2} \times \binom{4}{2}$  <u>incorrect</u>

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: $\binom{n}{k}$

$$\square\square\square\square \qquad same \qquad \square\,\square\,\square\,\square$$

$\quad\quad\uparrow\quad\uparrow \qquad\qquad\qquad\qquad \uparrow\quad\quad\uparrow$

$\quad\quad 1^{st}\quad 2^{nd} \qquad\qquad\qquad\quad 2^{nd}\quad\; 1^{st}$

- Best... Practice!

- Do small examples

- Several ways to solve!

S.KIMMEL

- Big-O questions

Not intersection:

larger
smaller



$$Sin(x) \leq \underline{1} \text{ for all } x \geq 0$$

$$Sin(x) = O(1)$$

(Change of base formula OK)

- Graph search $\longrightarrow$ PA

- Contradiction / Induction questions

Want to prove: $P \to Q$

-ssume for Contradiction: $P \wedge \neg Q$   7.5.3