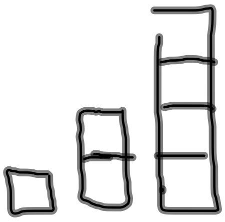
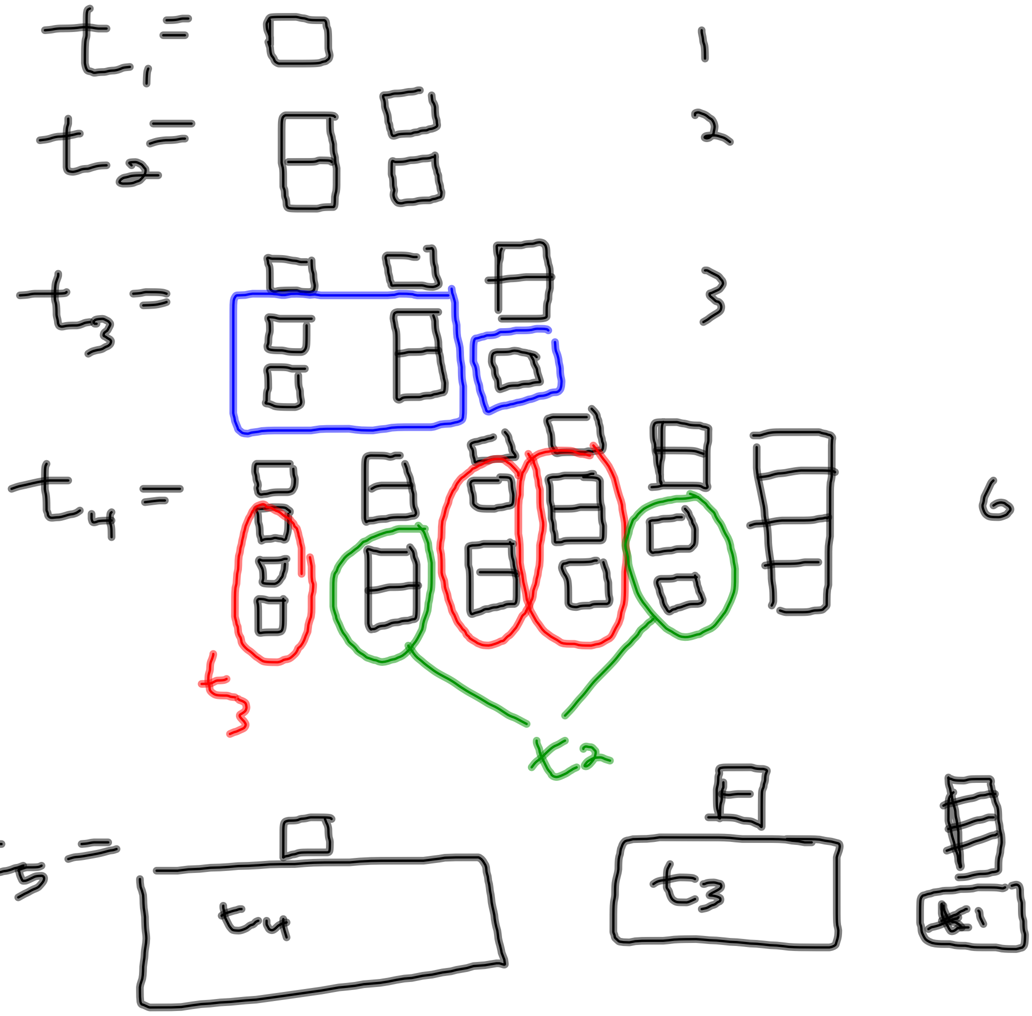
5.6 #40





$t_1 = 7$

$t_2 = 14$

$t_3 = 28$

$\vdots$

$t_{25} =$

$t_1 = 7$

$t_k = 2 * t_{k-1}$

Sets

$$\{x \in D \mid P(x)\}$$

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element of $\in$

$1 \notin \{a, 2, \{1\}\}$?

$\subseteq$, $\subset$

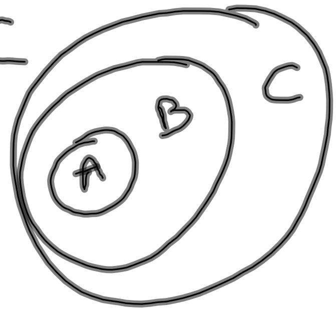
$\cup$, $\cap$, ^{c}

$A \cap B \subseteq A$

$A \cap B \subseteq B$

if $A \subseteq B$ and $B \subseteq C$

then $A \subseteq C$



Given sets A, B

prove $A \subseteq B$

$\forall x$, if $x \in A$ then $x \in B$

Suppose $x \in A$

Show $x \in B$

Element argument

Prove $A \cap B \subseteq A$

Suppose $x \in A \cap B$

Show $x \in A$

Since $x \in A \cap B$ we know

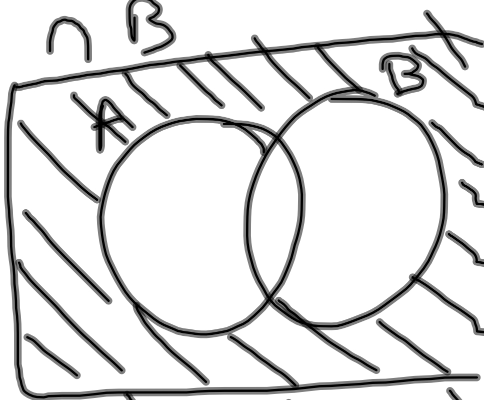
$x \in A$ and $x \in B$. So $x \in A$

QED

$$(A^c)^c = A$$

$$A \cup A = A$$

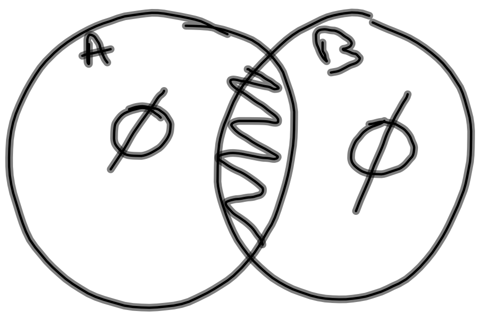
$$(A \cup B)^c = A^c \cap B^c$$



$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$

Prove $A = B$ for sets A and B

1. show $A \subseteq B$
2. show $B \subseteq A$



Prove $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

for all sets A, B, C

Let $X = A \cup (B \cap C)$

$Y = (A \cup B) \cap (A \cup C)$

I. show $X \subseteq Y$

Suppose $p \in X$, show $p \in Y$

so $p \in A$ or $p \in B$ and $p \in C$

case 1: $p \in A$

$\left.\begin{array}{l} \text{so } p \in A \cup B \\ \text{and } p \in A \cup C \end{array}\right\}$ these includ all items in A

so $p \in (A \cup B) \cap (A \cup C)$

since it is in both sets that are intersected.

case 2: $p \in B$ and $p \in C$

so $p \in (A \cup B)$

and $p \in (A \cup C)$

$\therefore p \in (A \cup B) \cap (A \cup C)$

II. show $Y \subseteq X$

if $p \in (A \cup B) \cap (A \cup C)$

then $p \in A \cap (B \cup C)$

so $(p \in A$ or $p \in B)$ and

$(p \in A$ or $p \in C)$