Alex Valentino Assignment 2 problem 6
300H

If S is a set, a partition of S is a set P of nonempty subsets of S satisfying the following two conditions: (i) for each $s \in S$, there is an $M \in P$ such that $s \in M$, and (ii) For each pair $M1, M2 \in P$ such that $M1 \neq M2$, we have $M1 \cap M2 = \emptyset$. The members of the partition are called the parts of the partition

- *Find all possible partitions of* $\{1, 2, 3, 4\}$.
  $\mathcal{P} = \{\{\{1, 2\}, \{3\}\}, \{\{1\}, \{2, 3\}\}, \{\{1, 3\}, \{2\}\}, \{\{1, 2, 3\}\}\}$
- *Give an example of a set of subsets of* $\{1, 2, 3, 4, 5\}$ *that satisfies (ii) but not (i).*
  $\{\{\{1, 2\}\}, \{\{3, 4\}\}\}$
- *Give an example of a set of subsets of* $\{1, 2, 3, 4, 5\}$ *that satisfies (i) but not (ii).*
  $\{\{\{1\}, \{2, 3, 4, 5\}\}, \{\{1\}, \{2\}, \{3, 4, 5\}\}\}$
- *Give an example of a partition of the set* $\{1\}$. $\{\{1\}\}$
- *Is it possible to have a partition of set* $\{\}$. *Why or why not?* It is. Since a partition can only have non-empty subsets, there are no partitions, thus the empty set's partition is just the empty set in braces, or $\{\{\}\}$.