Collections of sets

collections: sets that contain other sets

$B = \{\{0\}, \{4, 2, 1, -1, -2, -4\}, \{3, 1, -1, -3\}\}$

#s that divide 0 | #s that divide 4 | #s that divide 3

$|B| = 3$

Power sets

$\mathbb{P}(A)$ is powerset of A, set of all possible subsets of A.

$A = \{1, 2\}$

$\mathbb{P}(A) = \{\emptyset, \{1\}, \{2\}, \{1, 2\}\}$ $\qquad$ $\mathbb{P}(\emptyset) = \{\emptyset\}$

recall $\emptyset \subseteq A$ for all sets A

Partitions

base set A, we can partition it into non-overlapping subsets which cover the entire base set.

$A = \{0, 1, 4, 5, 7\}$

$B = \{\{0, 1\}, \{4, 5\}, \{7\}\}$ is a partition

$\{\{7, 4\}, \{1, 5, 0\}\}$ is also a partition

rules

1. union of elements of partition should equal base set
2. elements should have no overlap ($b_1 \cap b_2 = \emptyset$)

③ each element should not be $\emptyset$

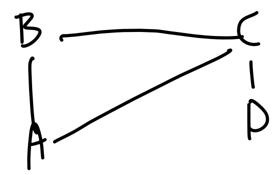
non-partitions of A

① $B = \{\{0\}, \{4,5\}, \{7\}\}$

② $B = \{\{0,1\}, \{1,4\}, \{5,7\}\}$

③ $B = \{\emptyset, \{0,1\}, \{4,5\}, \{7\}\}$

example) vertex set $= \{A, B, C, D\} = X$



$D : \mathbb{N} \to \mathbb{P}(X)$

$D(n) = \{v \in X \mid \text{degree of } v \text{ is } n\}$

$D(1) = \{D\}$

$D(2) = \{B, A\}$ ← one element of $\mathbb{P}(X)$

$S = \{D(n) \mid n \in \mathbb{N}\}$

$S = \{D(0), D(1), D(2), D(3), D(4), \ldots\}$

$S = \{\emptyset, \{D\}, \{B,A\}, \{C\}, \emptyset \ldots\}$

$S = \{\emptyset, \{D\}, \{B,A\}, \{C\}\}$ ← is this a partition of X?

no, it has the empty set as an element