

Agenda for Friday, April 12, 2024

Constructing new sets **2**

Practice **3**

Reminders

- Office hours Fri 2PM in Locy 203
- ! Exam 1 on April 23 in discussion

Warm-up

How many subsets does $S = \{a, b\}$ have? What about $P = \{a, b, c\}$?

Constructing new sets

Definition.

Definition.

Definition.

Name: _____

Practice

1. Each Cartesian product below is a subset of \mathbb{R}^2 . Draw each set in the xy -plane.

(a) $X \times Y$, where $X = \{1, 2, 3\}$ and $Y = \{1, 2\}$.

(b) $X \times Y$, where $X = \mathbb{R}$ and $Y = \mathbb{Z}$.

(c) $X \times Y$, where $X = \{1, 2, 3\}$ and $Y = \emptyset$

(d) $X \times Y$, where $X = [1, 2]$ and $Y = [1, 2]$

2. List the elements of the set $\mathcal{P}(\{1, 2\}) \times \mathcal{P}(\{3\})$. Be careful with brackets and parentheses!

3. What is the set described? Give a brief explanation.

Note: Let $\mathbb{N} = \{1, 2, 3, \dots\}$.

(a) $\bigcup_{i \in \mathbb{N}} \mathbb{R} \times [i, i + 1]$.

(b) $\bigcup_{X \in \mathcal{P}(\mathbb{N})} X$

4. If $J \neq \emptyset$ and $J \subseteq I$, does it follow that $\bigcup_{\alpha \in J} A_\alpha \subseteq \bigcup_{\alpha \in I} A_\alpha$? What about

$$\bigcap_{\alpha \in J} A_\alpha \subseteq \bigcap_{\alpha \in I} A_\alpha?$$