

Algebra Guided Exercises -- Academic Year 2025/2026

Sets and Applications - Part1

Series 2

Exercise 1: Give $\wp(E)$ a set of parts of E in the following cases :

- 1- $E = \{0\}$
- 2- $E = \{x \in \mathbb{R}; x^2 - 4 = 0\}$
- 3- $E = \emptyset$
- 4- $E = \{\{1\}, \emptyset\}$

Exercise 2: Let $E = \{1, x, z\}$ and $F = \{\emptyset, \{x\}, \{y\}\}$

Complete by $\in$ or $\subset$:

- 1- $x \dots \{x, y\}$
- 2- $\{x\} \dots \{\{x\}\}$
- 3- $\{1, x\} \dots E$
- 4- $\emptyset \dots E$
- 5- $\{\emptyset\} \dots F$
- 6- $\{z\} \dots E$
- 7- $\{\{x\}, \{y\}\} \dots F$
- 8- $\{y\} \dots F$

Exercise 3: Let A , and B two parts of a set E .

Show that : (X^c is the complement of X in E)

- 1- $A \subset B \Leftrightarrow B^c \subset A^c$
- 2- $A = B^c \Leftrightarrow A \cup B = E$ and $A \cap B = \emptyset$

Exercise 4: Let A , B and C three parts of a set E .

We assume that $A \cup B = B \cap C$. Show that : $A \subset B \subset C$.

Show if $A \cap B = A \cap C$ and $A \cup B = A \cup C$ then $B = C$

Exercise 5: Show that for all A , B and C of a set E :

$(A \Delta B) \cap C = (A \cap C) \Delta (B \cap C)$, Δ means symmetric difference.