Sets and Functions

ECON 441: Introduction to Mathematical Economics — Instructor: Div Bhagia

Distributive law

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

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

Verify the distributive law for:

$$A = \{1, 2, 3\}, B = \{2, 4, 6\}, C = \{4, 8\}$$

First part

Right hand side: $A \cup (B \cap C) =$

Left hand side: $(A \cup B) \cap (A \cup C) =$

Second part

Right hand side: $A \cap (B \cup C) =$

Left hand side: $(A \cap B) \cup (A \cap C) =$

Definitions:

- A *function* $y = f(x)$ is a relation where for each x there is a unique y. (One input does not give multiple outputs.)
- For a *one-to-one function*, each value of y is associated with a unique value of x. (Different inputs lead to different outputs.)
- *Inverse of a function* $x = f^{-1}(y)$ returns the corresponding value of x for each y.
- Only one-to-one functions have an inverse.
- Only strictly monotonic functions are one-to-one.

Questions:

- Is f a function if for $x_1 \neq x_2$, $f(x_1) = f(x_2)$? If yes, is it a one-to-one function?
- Consider the function $g : \mathbb{R}_+ \to \mathbb{R}$ such that $g(x) = x^2 + 4$. Is g a strictly increasing function? Find the inverse of g.