Foundations of Computer Science (COMP109)

Tutorial V, Week 30.10.2023 – 03.11.2023

*A reasonable attempt at answering Question (V.4.) should be submitted on Canvas by **23:59 on Tuesday 31.10.2023** either as a text entry, a text file (txt), a pdf file, or a photo of the handwritten answer. This assignment makes up 1% of your final mark. We would like to encourage you to discuss the questions with your fellow students in person or on the Canvas discussion board, but do not copy your answer from anybody else.*

V.1. List the elements of the following sets:

- $A = \{x \mid x \in \mathbb{Z} \text{ and } 1 \leq x \leq 7\}$;
- $B = \{x \mid x \in \mathbb{R} \text{ and } x \times x = 2\}$;
- $C = \{x \mid x \in \mathbb{N} \text{ and } x < 5 \text{ and } x^2 > 30\}$.

V.2. Write the following sets in the form $\{x \mid P(x)\}$:

- $A = \{4, 9, 16, 25, \cdots\}$;
- $B = \{0, 2, 0, 2, 0, 2, \cdots\}$;
- $C = \{2, 4, 6, 8, 10, \ldots\}$.

V.3. Which statements are true:

- $\{3, 4\} \subseteq \{4, 3\}$?
- {Leeds, Leeds} $\subseteq$ {Leeds}?
- $\emptyset \in \{$ Leeds, Liverpool $\}$?
- $\emptyset \subseteq \{$ Leeds, Liverpool $\}$?
- $\emptyset \in \{\emptyset\}$?
- $\emptyset \subseteq \{\emptyset\}$?
- $\emptyset = \{\emptyset\}$?

V.4. Let S be the following ordered sequence of elements $S = \langle 1, 2, 3, 4, 5, 6\rangle$ and the universal set U be $\{1, 2, 3, 4, 5, 6\}$. Write down the characteristic vectors of

- $A = \{1, 2, 4, 5\}$;
- $B = \{3, 5\}$;
- $\emptyset$;
- $A \cup B$;
- $A \cap B$;
- $A \cup \sim B$;
- $A \Delta B$.