Foundations of Computer Science (COMP109)

Tutorial VII, Week 11.11.2024 – 15.11.2024

*A reasonable attempt at answering Question (VII.5.) should be submitted on Canvas by **14:00 on Tuesday 12.11.2024** as a text entry, a text file (txt), a pdf file, or a photo of the hand-written answer. This assignment makes up 1% of your final mark. We want 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.*

VII.1. Let $25\mathbb{Z}$ be the set of all integers that are multiple of 25, $25\mathbb{Z} = \{n \in \mathbb{Z} \mid n = 25k, \text{ for some integer } k\}$. Prove that $25\mathbb{Z}$ has the same cardinality as the set of even integers.

VII.2. Let $A = \{1, 2, 3\}$ and $B = \{a, b\}$. Determine the set $A \times B$.

VII.3. Let A be a set. Determine the set $A \times \emptyset$.

VII.4. Suppose A and B are non-empty. What can be said about A and B if $A \times B = B \times A$?

VII.5. Which ordered pairs are in the relation $R = \{(x, y) \mid x > y\}$ on the set $A = \{1, 2, 3, 4\}$?

VII.6. Describe the set $(\mathbb{R} \times \mathbb{Z}) \cap (\mathbb{Z} \times \mathbb{R})$.