

Foundations of Computer Science (COMP109)

Tutorial IX, Week 25.11.2024 – 29.11.2024

*A reasonable attempt at answering Question (IX.4.) should be submitted on Canvas by **14:00 on Tuesday 26.11.2024** 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.*

IX.1. Determine for the following relations on the set of people if the relation is an equivalence relation, a partial order, both an equivalence relation and a partial order, or neither an equivalence relation nor a partial order.

- (a) 'has the same parents (both) as'
- (b) 'has at least one parent same as'
- (c) 'is a brother of'
- (d) 'is at least as clever as'.

IX.2. Let R and S be relations on a set A . Use proof by contradiction to show that if R and S are partial orders then $R \cap S$ is also a partial order.

IX.3. A woman has six dresses, five pairs of trousers and three shirts. Assuming that the woman can either wear a dress or she can wear trousers with a shirt, how many different outfits does she have? (Explain how you got your answer using the "sum rule" and the "product rule".)

IX.4. What are the values of the following expressions?

- $\sum_{i=3}^6 (i^2 + 6)$
- $\prod_{j=1}^5 (j/2)$
- $4!$
- $0!$
- $\binom{6}{2}$
- $C(6, 2)$