

Foundations of Computer Science (COMP109)

Tutorial X, Week 21.12.2020 – 25.12.2020

A reasonable attempt at answering Question X.4. should be submitted on Canvas by 23:59 on Tuesday 22.12.2020 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.

X.1. Find the 8-bit two's complements for the following integers:

- 25
- 68
- 116

X.2. Assuming the following are 8-bit representations of signed integers (using two's complement), compute

- $25 + (-68)$
- $(-25) + (-68)$

X.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”.)

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

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

X.5. A football squad has 18 players; 11 players make a team. How many different teams are possible?

X.6. If a phone number is allowed to start with any digit, including 0, how many 6-digit phone numbers have distinct digits?

X.7. A National Lottery lotto draw selects a set of six different numbers from 1, 2, . . . , 49. Each choice is equally likely.

You choose a set of six numbers in advance. If your numbers come up, you win the jackpot. What are the chances that your selection is correct?