Please solve the following exercises at home prior to the tutorial:

Exercise 1

Solve the following exercises by first converting the decimal numbers to binary and then performing the addition in binary.

a) $(15)_{10} + (31)_{10} = ?_2$
b) $(105)_{10} + (21)_{10} = ?_2$

Exercise 2

Subtract the following numbers in two's complement using 8 digits (B-complement with B=2).

a) $43_{(10)} - 11_{(10)}$
b) $17_{(10)} - 109_{(10)}$

Exercise 3

a) What is the largest unsigned 5-bit number?
b) What is the largest 5-bit number in two's complement?
c) What is the smallest 5-bit number in two's complement?

Exercise 4

Unix operating systems count the time since 1.1.1970 by incrementing a number every second. What is the resulting problem when using a 32-bit signed integer? When will this problem manifest?

Exercise 5

Subtract the following numbers using B-Complement (B=10) using 5 digits:

a) $25737_{(10)} - 18547_{(10)}$
b) $2737_{(10)} - 4578_{(10)}$

The following exercises will be done during the tutorial:

Exercise 6

Subtract the following numbers using (B-1)-Complement with 8 digits and B=2:

$57_{(10)} - 122_{(10)}$

Exercise 7

Make the B-Complement (B=16 or B=5) for the following numbers:

a) $(AFFE)_{16}$
b) $(124)_{5}$

Exercise 8

Subtract the following numbers using (B-1)-Complement (B=10) using 5 digits:

a) $25737_{(10)} - 18547_{(10)}$
b) $2737_{(10)} - 4578_{(10)}$