MSE Hand in 2

The assignments are to be solved in pairs. Each pair can only hand in one solution. Submission by the end of class. The assignments must be solved by hand.

Assignment 1

These are recap exercises from last week's topic.

(a) Find $\gcd(75, 240)$.

(b) What is $\varphi(187)$?

Assignment 2

(a) Convert the decimal number 57 to binary.

(b) Convert the decimal number 57 to Hexadecimal. You may depart from your answer to question (a).

(c) Calculate $11010_2 + 1101_2$ in binary

(d) Calculate $100_2 \cdot 111_2$ in binary.

Assignment 3

(a) Find the binary and the hexadecimal expansion of the decimal number 1337.

(b) Find the binary and the decimal representation of the hexadecimal number $F1D0_{16}$.

(c) Multiply the numbers 10010_2 and 100101_2 in binary.

(d) Convert your answer from exercise (c) to hexadecimal and decimal.

Assignment 4

Let H be the set of all hexadecimal numbers with 2 digits, let B be the set of all binary numbers with 9 digits, and let f be a function from H to B such that $f(x) = x_2$.

(a) What is the order of H ?

(b) What is the order of B ?

(c) Determine $f(A3)$.

Assignment 5

A calculator has space for 4 digits on its screen. In the exercises below, assume you have all the characters from 0-9 and from A to F available

(a) What is the largest decimal number you can write on the calculator?

(b) What is the largest binary number you can write on the calculator? State your result both in binary and in decimal.

(c) What is the largest hexadecimal number you can write on the calculator? State your result both in hexadecimal and in decimal, and then try to figure out (e.g. by googling!) why this number is important in the field of computing.

(d) State the number 65537_{10} in binary and then try to figure out why this number is so very important in public key cryptography (e.g. by googling!).