

Computer Systems and -architecture

Data Representation

1 Ba INF 2011-2012

Ruben Van den Bossche
ruben.vandenbossche@ua.ac.be

Sam Verboven
sam.verboven@ua.ac.be

Time Schedule

Exercises are made individually. Put all your files in a tgz archive, as explained on the course's website, and submit your solution to the exercises on Blackboard.

- Deadline: **October 31, 23u55**

Exercises

1. Convert these positive numbers to base 10.
 - (a) $(111110110)_2$
 - (b) $(010000010)_2$
 - (c) $(A15D)_{16}$
 - (d) $(777)_{16}$
 2. Convert to base 10.
 - (a) $(1000)_2$ (2's complement)
 - (b) $(1111)_2$ (2's complement)
 - (c) $(.201)_3$
 3. Convert to base 2.
 - (a) $(1066)_{10}$
 - (b) $(1939)_{10}$
 - (c) $(3.30)_{10}$
 - (d) $(1FF)_{16}$
 - (e) $(35A7)_{16}$
 4. Convert to base 2. Represent the negative numbers with 8 bits in *signed magnitude*, *one's complement*, *two's complement* and *excess 128*.
 - (a) $(-112)_{10}$
 - (b) $(-127)_{10}$
 - (c) $(-31)_{10}$
 - (d) $(-11)_{16}$
-

5. For the following single-precision IEEE 754 bit patterns, show the numerical value as a base 2 significand with an exponent (e.g. $+1.11 \cdot 2^5$).

(a) 0 10000011 011000000000000000000000

(b) 1 10000000 000000000000000000000000

(c) 1 00000000 000000000000000000000000

(d) 1 11111111 000000000000000000000000

(e) 0 11111111 110100000000000000000000

(f) 0 00000001 100100000000000000000000

(g) 0 00000011 011010000000000000000000

6. Represent these numbers in the *IEEE-754 (single precision)* format.

(a) $(1023.125)_{10}$

(b) $(-3.142)_{10}$

(c) $(2048)_{10}$

(d) $-\infty$

(e) $+0$