# Computer Systems and -architecture

Data Representation

*1 Ba INF 2013-2014*

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## 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: **November 4, 23u55**

## Exercises

1. Convert these positive numbers to base 10.
   (a) $(1001111011)_2$
   (b) $(90AD)_{16}$
   (c) $(11101010)_2$
   (d) $(7DE)_{16}$
2. Convert to base 10.
   (a) $(1001)_2$ (2's complement)
   (b) $(1111)_2$ (2's complement)
   (c) $(.112)_3$
3. Convert to base 2.
   (a) $(1854)_{10}$
   (b) $(754)_{10}$
   (c) $(3AF)_{16}$
   (d) $(3.30)_{10}$
   (e) $(37AB)_{16}$
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) $(-11)_{\mathbf{16}}$

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 01100000000000000000000`

   (b) `1 10000000 00000000000000000000000`

   (c) `1 11111111 00000000000000000000000`

   (d) `1 00000000 00000000000000000000000`

   (e) `0 11111111 11010000000000000000000`

   (f) `0 00000001 10010000000000000000000`

   (g) `0 00000011 01101000000000000000000`

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

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

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

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

   (d) $-\infty$

   (e) $+0$