Hand-in assignments (Tuesday, week 2)

Your name and student number must be on each page.

Exercise 1

Give the missing representations with the minimum number of digits

Base 2	Base 8	Base 16	Base 10	Base 9
010101010101				
	123			
		A0B		
			10	
				10

Exercise 2

Give the representation of the decimal value **-154** in the following representation using 10 bits.

Sign magnitude	
Signed (2-complement)	
1-complement	
Excess 155	

Exercise 3

What is the decimal value of the signed fixed point number (base 2) 1100011with point 3 position from the right

Exercise 4

Give the unsigned fixed point representation in base 3 for the decimal value 12**.**34
Use 8 digits, point 4 position from the right. Use rounding style truncation.

Exercise 5

DEC introduced a 32 bit floating point number system with the following properties:

- Fraction: 23 bits and additional 1 hidden bit. Point is left of hidden bit
- Exponent: 8 bits in excess 128 code
- Sign bit (1 = negative, 0 = positive).
- Number is not normalized if exponent field is filled with zero's. In that case the represented value (independent of sign and fraction field) is zero.
- Truncation is used for rounding.

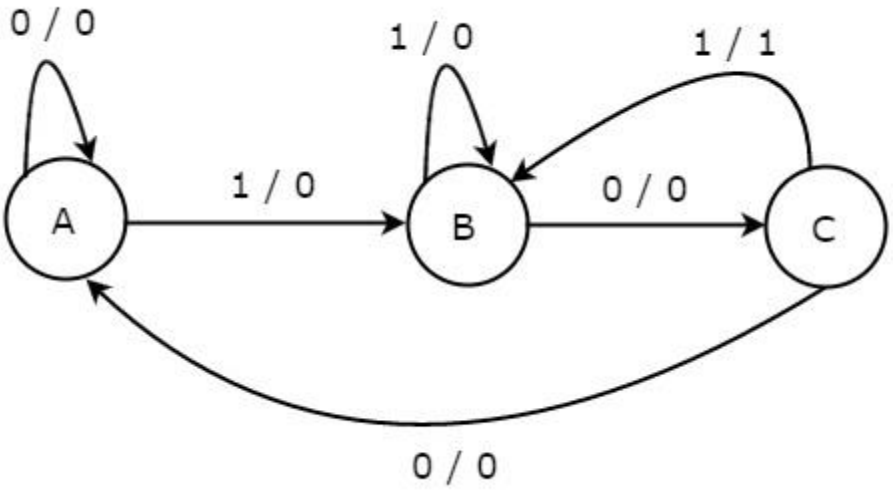
Questions:

For a) until f) the normalized numbers:

a) Max decimal value of the mantissa (M_{max})
b) Min decimal value of the mantissa (M_{min})
c) Max decimal value of the exponent (E_{max})
d) Min decimal value of the exponent (E_{min})
e) Largest positive decimal value that can be representend (V_{max})
f) Smallest positive decimal value that can be represented (V_{min})

g) What is the smallest positive decimal numbers that can be represented?
And what is the next positive value that can be exactly represented?
h) What is the representation of $2\ ^{9}/_{16}$?
i) What is the representation of the decimal value 0.2 ?
j) What decimal value is represented with the pattern:
1 00000111 11010000000000000000001

Exercise 6



The finite state machine has in X and output Y and is realized with 2 Data flip-flops, F1 and F0. The coding of the states is:

State	F1 F0
A	1 1
B	0 1
C	1 0

There are three states in the FSM but a realization with 2 flip-flops has 4 possible values. What should happen when both flip-flops are 0?

Multiple solutions are possible, e.g.:

a) F1=0 and F0=0 is don't care. It can have any behavior (the next state is don't care (it could even remain in this state; deadlock), and the output is don't care.
b) F1=0 and F0=0 also represents another state. In this exercise we assume it behaves as state A.

Solution a)

- Give state table
- Give the one-dimensional state table
- Derive simplified SOP Boolean equations for DF1 (data input of F1), DF0 and Y

Solution b)

- Give state table
- Give the one-dimensional state table
- Derive simplified SOP Boolean equations for DF1, DF0 and Y