SOFT400127: Computer Organization and Architecture 2022-Fall Homework- **9** Solutions

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Honor Code: I promise that I finished the homework solutions on my own without copying other people's work.

Computer Arithmetic

Attention: "|" is just for reading convenience.

1.

Answer: **0|10000011|01001001100000000000000**,

$(20.59375)_{10} = (10100.10011)_2 = (1.010010011)_2 \times 2^4$

- Sign. Positive float, 0.

- Exponent. $4_{10} = (10000011)_2$(biased with -127).

- Mantissa. 010010011 along with following zeros.

Summary as below:

Sign (1 bit)	Exponent (8 bits)	Mantissa (23 bits)
0	10000011	01001001100000000000000

2.

Answer: **11.375**.

$(41360000)_{16} = (0100|0001|0011|0110|0000|0000|0000|0000)_2 = (0|10000010|01101100000000000000000)_2$

- Sign. 0, so positive float.

- Exponent. $(10000010)_2$(biased with -127) = 3.

- Mantissa. Take off following zeros, $(1.011011)_2$

So the float is $(1.011011)_2 \times 2^3 = (1011.011)_2 = 11.375$

3.

Register	Variable	type	bits	value	
R1	x	unsigned int	**10000110**	134	
R2	y		11110110	246	
R3	m	int	10000110	**-122**	
R4	n		11110110	-10	
R5	z1	unsigned int	**10010000**	144	overflow
R6	z2		**01111100**	124	overflow
R7	k1	int	10000110	**-112**	
R8	k2		01111100	124	**overflow**

Other things

- LaTeX code refer to these things and was complied on texlive2020.

    – UCB-CS70's given homework template.

    – A free website useful to edit LaTeX formula code.

- Some context refer to Professor Li. 's PPT.

Thanks for your correcting and grading :).