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Name: Blake Moore Circle your lab: 2 3:30 4:30 5:30 **Introduction**

The goal of this lab is to introduce and give you practice IEEE 754 Floating Point conversion.

**Due:**

Monday, November 21, 2022

Submission: Print and bring your submission to class on Monday. Late submissions will not be accepted

**Instructions**

While I know this would be much easier to do by hand. I have found grading to be easier when your answers are typed. Therefore, you **must** type your answers print and bring the document to class. If you are sick and cannot come to class you must email the homework to me by 9:00 a.m on November 21. Please read the entire document. Points will be deducted if you do not follow directions.

Part 1:

Watch one of the two sets of videos pertaining to Floating Point conversion from decimal to binary and binary to decimal. I found both of these to be helpful, so feel free to watch both.

https://www.youtube.com/watch?v=tx-M\_rqhuUA https://www.youtube.com/watch?v=4DfXdJdaNYs

or

https://www.youtube.com/watch?v=8afbTaA-gOQ https://www.youtube.com/watch?v=LXF-wcoeT0o

Part 2: 50 points

Following the instructions in the videos above. Convert the following floating-point number to binary.

79.35

79/2 = 39 remainder 1, 39/2 = 19 remainder 1, 19/2 =9 remainder 1, 9/2 =4 remainder 1, 4/2 = 2 remainder 0 2/2 = 1 remainder 0, 1 / 2 = 0 remainder 1, so 79 in binary is 1001111

I divide by two to convert to binary because it is an integer and not a past the decimal point

For .35: .35 \* 2 = 0 + 0.7, .07 \* 2 = 1 +.4, .4 \* 2 = 0 + 0.8, .8 \* 2 = 1+.06, .06 \* 2 = 1 +.2, .2\*2 = 0+.4, .4\*2 = 0, .8 \* 2 = 1 + .6 , .6\* 2 = 1 + 0.2, .19999 \* 2 = 0 +.4

I repeat the part from .4\*2 to the .2 \*2.

.35 to binary is .0101100110

Mantissa is 23 so theres 23 bits following

So 79.35 = 1001111.010110 01100110110011001

The part separated by a space is the repeating part of .35

Show your work. Also, explain what you are doing each step of the way. Your explanation does not have to be a long explanation. Only enough to let me know you understand what you are doing. If you do not show and explain your work, you will receive a 0 for the question.

Part 3: 50 points

Following the instructions in the above video. Convert the following binary representation to a floating point number.

0100 0010 1010 0111 1000 0000 0000 0000

First bit is zero so it will be a positive number

0 100 0010 1010 0111 1000 0000 0000 0000

Convert this part to decimal and subtract the exponent bias

1\*2^7 + 1\*2^2+ 1\*2^0 = 133 -127 = 6

0100 0010 1010 0111 1000 0000 0000 0000

These get raise to their respective 2^-n power

1 \* 2^-2 + 1\*2^-5 + 1\*2^-7 = .30859375

Then convert to scientific notation using the formula provided

(-1)^0 \* (1+.30859375) \* 2^6 = 1.30859375 \*64

Then calculate it out to get floating point number

1.30859375 \*64 = 83.75

Show your work. Also, explain what you are doing each step of the way. Your explanation does not have to be a long explanation. Only enough to let me know you understand what you are doing. If you do not show and explain your work, you will receive a 0 for the question.

The following link is a nifty tool you can use to check your work. You should understand that sometime online tools like this will round which could change the last one or two bits on the tool. So, if your answer has a different bit on the end that is perfectly fine. I am not saying this will be the case only letting you know this could happen.

https://evanw.github.io/float-toy/

Submission:

Print and bring you submission to class on Monday, November 21, 2022. I will not accept late submissions.