Important: If you refer to a resource or use any examples and/or code as a starting point anywhere in your work, ensure that you include the URL of where you obtained the code or information in a comment in your code as close as possible to where the idea or code was used, or as near as possible to where you used the resource in your answer. For code, refer to the source in the line directly below the comment with the URL, include a short explanation of how the resource was used in your work. Do not under any circumstances share resources such as notes or references with other students, and do not discuss or share your code or your approach with anyone.

1. (4 pts) Convert your student ID to a floating point value and represent it in the floating point notation used in the textbook. Keep in mind that floating point encoding sometimes cannot store the exact value, but it can store as close as possible.

2. (6 pts) Write a pseudo-code algorirthm for converting a decimal number to the floating point notation used in the textbook. Your algorithm should be able to handle any positive value as small as 0.001 and as high as 1000 without losing precision. Your algorithm should also be able to correctly handle any value as small as negative 0.001 and negative 1000. The computing agent that will follow your pseudocode is a human being who can use any function that is available on a scientific calculator. That means you don't have to explain how to convert to binary. You can instead tell the computing agent to convert to binary using the calculator. However, there is no scientific calculator that you can buy that can convert to the floating point notation used in the textbook, so additional instructions are necessary.

3. (5 pts) Represent the above algorithm as a flow-control diagram

4. (5 pts) Determine and justify the computational complexity (Big-O) of the above algorithm in relation to the value of n, the number to be encoded (your student ID). The corrrect answer to this question is likely to be easy to find, but will depend heavily on your answer to the above questions.

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5. (10 pts) For this circuit, select the last two non-zero digits in your student id and assign them to x.

For instance:

If your student id is 300187809, x=89.

If your student id is 300187310, x=31.

If your student id is 300217829, x=29.

Treat x as a numeric value in decimal notation.

Convert x to binary format. For instance, if x=31, binary representation is 0001 1111 (space for the nibble is for readability, otherwise 00011111).

Use each of the bits in the binary representation to populate the output column of truth table that has thee input columns. The leftmost bit provides the output column for the first row of the truth table, the next bit provides the output for the next row in the truth table, and so on. For the value 31, we produce the following truth table:

a b c | out

0 0 0 0

0 0 1 0

0 1 0 0

0 1 1 1

1 0 0 1

1 0 1 1

1 1 0 1

1 1 1 1

. 3

Important: your truth table must have exactly the same rows as above in exactly the same order, except that the "out" column must be derived from x as above. For example, if x is 11, the binary representation is 0000 1011, so the truth table would look as follows:

a b c | out

0 0 0 0

0 0 1 0

0 1 0 0

0 1 1 0

1 0 0 1

1 0 1 0

1 1 0 1

1 1 1 1

Follow the circuit construction algorithm called the sum of products to produce a logic circuit for the truth table corresponding to the value of x that corresponds to the last two non-zero digits of your student id as described above. A truth table for any other vaue will be awarded zero marks for this question.

6. (10 pts) - using the notebook link below write an assembly language program using our custom assembler and loader, which you can find at the link below:

use this notebook link

Your program should take an input value from the user and should return a value that is 1/2 of that value. In case where an exact half is not possible, your program should also print out the remainder on the next line.

For example:

IN: 5

OUT: 2

OUT: 1

Since we do not have a division instruction, you will need to be resourceful. However, you must stick to the instructions and functionality that we currently have available.

4

7. (5 pts) If your student ID is even, make a deontological argument in favor of downloading a PDF of the textbook instead of paying for it. If your student ID is odd, make a deontological argument aginst downloading a PDF of the textbook. If your student ID is divisible by 3, construct your argument using analogy. Otherwise, construct your argument using the dialectical.

8. (5 pts) If your student ID is even, make a consequentialist argument against downloading a PDF of the textbook instead of paying for it. If your student ID is odd, make a consequentialist argument in favor of downloading a PDF of the textbook. If your student ID is divisible by 3, construct your argument using the dialectical. Otherwise, construct your argument using analogy.