Assignment8 - Due: Friday, October 9th, 5pm

Assignment

CSE/EEE230 Assignment8

Due Date

Friday, October 9th, 5pm

Important: This is an individual assignment. Please do not collaborate. Do not share your solution with anyone.

Make sure to follow the academic integrity policies.

It must be submitted on-line (course website)

The document needs to be 100% typed (no hand written answers) If it is not typed, it will be zero on the assignment.

Upload your file containing your solution to the course website by the assignment deadline. PDF, word (.doc, docx), and power point (.ppt, pptx) files are accepted.

20 points total (This assignment will be counted towards your grade).

No late assignment will be accepted

Objectives:

-convert numbers from decimal into binary fixed point representation.
-perform binary integer multiplication and division.
-perform binary floating point addition and multiplication.

-convert numbers from decimal into IEEE 754 single precision floating point format.
-convert numbers from IEEE 754 single precision floating point format into decimal.

Assignment Description:

1. (2 pts) Perform a multiplication of two binary numbers (multiplicand 0110 and multiplier 0110) by creating a table to show steps taken, multiplicand register value, multiplier register value and product register value for each iteration by following the steps described in the following document. (Points will be deducted if steps are not shown.)

Read this steps (https://canvas.asu.edu/courses/56799/files/17494423/download?wrap=1)

You can use this table to start: **hw8_1.pdf (https://canvas.asu.edu/courses/56799/files/21816168/download?wrap=1)** (PDF) **hw8_1.ppt (https://canvas.asu.edu/courses/56799/files/21816169/download?wrap=1)** (PPT)

2. (2 pts) Perform a division of two binary numbers (divide 0011 0110 by 0110) by creating a table to show steps taken, quotient register value, divisor register value and remainder register value for each iteration by following the steps described in the following document. (Points will be deducted if steps are not shown.)

Read this steps (https://canvas.asu.edu/courses/56799/files/17494409/download?wrap=1)

You can use this table to start: **hw8_2.pdf (https://canvas.asu.edu/courses/56799/files/21816170/download?wrap=1)** (PDF) **hw8_2.ppt (https://canvas.asu.edu/courses/56799/files/21816174/download?wrap=1)** (PPT)

3. (2 pts) Convert -4563 $_{ten}$ into a 32-bit two's complement binary number.

4. (2 pts) What decimal number does this two's complement binary number represent:

1111 1111 1111 1111 1111 0011 1000 0011 $_{two}$?

5. (2 pts) What would the number 18653.4140625 $_{ten}$ be in IEEE 754 single precision floating point format. You need to follow the following steps:

a). Write the above number in binary. (before normalizing it)

b). Write the above number in the normalized format.

c). Compute the biased exponent, and write it in binary.

d). Write its IEEE 754 single precision floating point format in binary, then in hex. (using 8 hex numbers)

6. (2 pts) What would the number -18472.40625 $_{ten}$ be in IEEE 754 single precision floating point format.

You need to follow the following steps:

a). Write the above number in binary. (before normalizing it)

b). Write above number in the normalized format.

c). Compute the biased exponent, and write it in binary.

d). Write its IEEE 754 single precision floating point format in binary, then in hex. (using 8 hex numbers)

7. (2 pts) What decimal number would the IEEE 754 single precision floating point number 0xC5A3B760 (this is in hex) be? Write your final answer in scientific notation as m x 10^{p} where p is an integer.

8. (2 pts) For this problem, assume 5 bits precision. Add two binary numbers,

$1.0011_{two} \times 2^{-8}$ and $1.0101_{two} \times 2^{-6}$ by showing the following steps:

Step1: The significand of the number with the lesser exponent is shifted right to match the exponent of the larger number.

Step2: Add the significands. (you can assume that you can carry all digits)

Step3: Normalize the sum, determine whether there is an overflow or an underflow.

Step4: Truncate the sum (using 5 bits precision.)

9. (2 pts) For this problem, assume 5 bits precision. Multiply binary two binary numbers,

$1.0011_{two} \times 2^{-8}$ and $1.0101_{two} \times 2^{-6}$ showing the following steps:

Step1: Adding the exponent without bias.

Step2: Multiply the significands. (you can assume that you can carry all digits)

Step3: Normalize the product and check for an overflow or an underflow.

Step4: Truncate the product. (using 5 bits precision.)

10. (2 pts) Add $8.96_{ten} \times 10^{10}$ to $6.87_{ten} \times 10^{8}$, assuming the following two different ways:

a) you have only three significant digits, first with guard (2 digits) and round digits.

b) you have only three significant digits without guard and rounding.

What to turn in:

-Upload your file containing your solution to the course website by the assignment deadline. PDF, word (.doc, docx), and power point (.ppt, pptx) files are accepted. If you want to use other type of files, please check with the instructor. Make sure that your files have your name and email address.

-The document needs to be 100% typed (no hand written answers) If it is not typed, it will be zero on the assignment. (this is to check for an academic integrity violation)