University of Delaware
CISC260 Homework 5 Solution

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1 Problem 1

Answer:
a.
1 1000 0010 1111 0100 0000 0000 0000 000
It can be represented exactly.

b.
0 0111 1100 0101 0101 0101 0101 0101 011
It can not be represented exactly.

2 Problem 2

Answer:
a.
$3.9443045E-31$ or 2^{-101}

b.
-916.

3 Problem 3

Answer:
Multiply a number by 16 is equivalent to multiply by 2^4, which is adding 4 to the exponent parts of the IEEE 754 representation.
This can be easily done by the following procedure: (one way but not the only way)

1. Extract exponent part by AND operation.
X AND 0 11111111 00000000000..

2. Extract other parts except exponent part by AND operation.
X AND 1 00000000 11111111111..

3. Shift the exponents result to the right 23 bits

4. Add the result in 3 by four.

5. Shift the result in 4 left 23 bits.

6. OR result in 5 with result in 2.

Result in 6 will be the final answer.

4 Problem 4

Answer:
This is caused because binary representation of number may not be exact.
One way to fix it is to scale up everything as factor of ten ,they are:
fundLeft, initial cost, increment of cost

5 Problem 5

Answer:
See attached file.