

1. Assume a 10-bit floating point representation format where the Exponent Field has 4 bits and the Fraction Field has 5 bits and the sign bit field uses 1 bit

<b>S</b>	<b>Exponent Field: 4 bits</b>	<b>Fraction Field: 5 bits</b>
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- a. What is the representation of  $-8.80158 \times 10^{-2}$  in this Format (in Binary:  $-0.00010110100010000011$ )

[assume:

$\text{bias} = 2^{N-1} - 1 = 2^{4-1} - 1 = 7$  (where  $N$  = number of exponent field bits) for normalized representation, and  $1 - \text{bias} = -6 = \text{bias for denormalized representation}$ ].

What 10-bit pattern represents the number  $-0.125 = -1/8$ ? What base-10 integer or fraction does this 10-bit floating point representation format of  $0101001001$  equal to?

- b. What is the range of representation for *positive normalized* numbers – what is the largest and smallest *normalized* number represented in this format? What is the range of representation for *positive denormalized* numbers? – what is the largest and smallest *denormalized* number represented in this format?

2. Implement in RISC V these line of code in C:

(i)  $f = g - A[B[C[27]]]$

(ii)  $f = g - A[C[10] + B[11]]$

(iii)  $A[i] = 4B[4i-44] + 3C[32i+32]$

3. Hypersonic Computers, your employer, has just bought a new dual Core processor, and you have been tasked with optimizing your software for this processor - for two applications on this dual Core processor, but the resource requirements are not equal. The first one needs 80% of the resources, and the second only 20%.

(i) Assume that 40% of the first application is parallelizable, how much speedup would you achieve with that application if run in isolation? Assume that 99% of the second application is parallelizable, how much speedup would this application observe if run in isolation?

(iii) Given that 40% of the first application is parallelizable, how much overall system speedup would you observe if you parallelized it? Given that 99% of the second application is parallelizable, how much overall system speedup would you observe if you parallelized it?