Lab 5 IEEE

Questions:

1) Convert 4.687510 to IEEE 754 single precision.

1. Convert 410 to binary is 1002
2. Convert 0.687510 to binary by multiplying by 2

0.687510 = 0.10112

0.6875 x 2 = 1.375

0.375 x 2 = 0.75

0.75 x 2 = 1.5

0.5 x 2 = 1

Therefore, 4.687510 = 100.10112

1. Normalize the binary number 100.1011 = 1.001011 x 22
2. Calculate the exponent: 127+2 = 129 🡪12910 = 100000012
3. Write the mantissa 001011 00000000000000000

Sign bit = 0

Exponent: 10000001

4.687510 = 100.10112 = 0100 0000 1001 0110 0000 0000 0000 0000

4 0 9 6 0 0 0 0

1. Convert to Hexadecimal 4.687510 = 4096000016

2) Convert number 0.4062510 to IEEE 754 single precision.

1. Convert 0.4062510 to binary by multiplying by 2

0.4062510 = 0.011012

0.46025 x 2 =0.8125

0.8125 X 2 = 1.625

0.625 X 2 = 1.25

0.25 X 2 = 0.5

0.5 X 2 =1

1. Normalize the binary number 0.01101= 1.101 x 2-2
2. Calculate the exponent: 127 – 2 = 125 🡪 12510 = 11111012
3. Write the mantissa 101 00000000000000000000

Sign bit = 0

Exponent: 1111101

0.4062510 = 0.011012 = 0011 1110 1101 0000 0000 0000 0000 0000

3 E D 0 0 0 0 0

1. Convert to Hexadecimal 0.4062510 = 3ED000016

3) Convert number -1.7510 to IEEE 754 single precision

1. Convert 0.7510 to binary by multiplying by 2

0.7510 = 0.112

0.75 X 2 = 1.5

0.5 X 2 = 1

Therefore, -1.7510 = -1.112

1. Calculate the exponent: 12710 = 11111112
2. Write the mantissa 11 000000000000000000000

Sign bit = 1

Exponent: 1111111

-1.7510 = -1.112 = 1011 1111 1110 0000 0000 0000 0000 0000

B F E 0 0 0 0 0

1. Convert to Hexadecimal -1.7510  = BFE0000016

4) Convert number 22510 to IEEE 754 single precision

1. Convert 22510 to binary is 22510 = 111000012
2. Normalize the binary number: 11100001 = 1.1100001 X 27
3. Calculate the exponent: 127 + 7 = 134 🡪 13410 = 100001102
4. Write the mantissa 1100001 0000000000000000

Sign bit = 0

Exponent: 10000110

22510 = 111000012 = 0100 0011 0110 0001 0000 0000 0000 0000

3 4 6 1 0 0 0 0

1. Convert to Hexadecimal 22510 = 3461000016

5) Convert the number 125.75 to IEEE 754 single-precision

1. Convert 12510 to binary is 11111012
2. Convert 0.7510 to binary by multiplying by 2

0.7510 = 0.112

0.75 X 2 = 1.5

0.5 X 2 = 1

Therefore, 125.7510 = 1111101.112

1. Normalize the binary number: 1111101.11 = 1.11110111 X 26
2. Calculate the exponent: 127 + 6 =133 🡪 13310 = 100001012
3. Write the mantissa 11110111 000000000000000

Sign bit = 0

Exponent: 10000101

125.7510 = 1111101.112 = 0100 0010 1111 1011 1000 0000 0000 0000

4 2 F B 8 0 0 0

1. Convert to Hexadecimal 125.7510 = 42FB800016

40 mins