Assignment\_4 Solution (from textbook)

**3.23**

63.25 = 63 + 0.25

63 = 0x3f = 0b00111111 = 1111112

0.25 = 0.25 x 4 / 4 = 1/4 = 1 / 22 = 1 x 2-2 =0.012

63.25 = 63 + 0.25 = 1111112 + 0.012 = 111111.012 = 1.11111012 x 25

Sign bit = 0

Fraction = 1111 1010 0000 0000 0000 000

Exponent – Bias = 5

Exponent = 5 + Bias = 5 + 127 = 132 = 0x84 = 100001002

Final bit pattern: 0 1000 0100 1111 1010 0000 0000 0000 000

3.24 (only answer is provided)

Final bit pattern:

0 100 0000 0100 1111 1010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

3.25

The IBM floating point number is represented as the following formula:

(-1)sign × 0.fraction16 × 16 (exponent-64)

63.25 = 63 + 0.25 = 1111112 + 0.012 = 111111.012 = 111111.012  x 20= 111111.012 x 160 =

111111.01002 x 160 = 3f.416 x 160 = .3f416 x 162

Sign = 0

Fraction = 3f416 =0011 1111 0100…02 (24 bits)

Exponent – 64 = 2, thus exponent = 64 + 2 = 66 = 0x42 = 10000102 (7 bits)

Final bit pattern: 0 1000010 001111110100000000000000

3.41

-1/4 = -0.25

0.25 = 0.25 x 4 / 4 = 1/4 = 1 / 22 = 1 x 2-2 =0.012 = 1.0 x 2-2

Sign = 1 (negative)

Fraction = 0….0 (23 bits)

Exponent – bias = Exponent – 127 = -2, thus, Exponent = 125 = 0x7d = 011111012

Final bit pattern (an exact representation)

1 01111101 00000000000000000000000