Henzi Kou

CIS 314

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1. Convert the following hex values to decimal assuming that they are stored as 32-bit 2s complement integers:
   1. 0x000000C6

0000 0000 0000 0000 0000 0000 1100 0110

27 + 26 + 22 + 21 = 198

* 1. 0xFFFFFEC6

1111 1111 1111 1111 1111 1110 1100 0110

0000 0000 0000 0000 0000 0001 0011 1001

(-1) \* (28 + 25 + 24 + 23 + 20 + 1) = -314

* 1. 0xFFFFFFFF

1111 1111 1111 1111 1111 1111 1111 1111

231 + 230 + … + 20 = -1 \*Special case given in lecture\*

1. Convert the following hex values to decimal assuming that they are encoded as IEEE 754 single-precision floating-point numbers:
   1. 0x80000000

1 | 000 0000 0 | 000 0000 0000 0000 0000 0000

S E M

S = 1

E = 0 – 127 = -127

M = 0000…

(-1)1 \* 0 \* 2 = -0

* 1. 0x439D0000

0 | 100 0011 1 | 001 1101 0000 0000 0000 0000

S E M

S = 0

E = 1000 0111 – 127 = 135 – 127 = 8

M = 001 1101 0000… = 1/8 + 1/16 + 1/32 + 1/128 + 1= 157/128

(-1)0 \* 157/128 \* 28 = 314

* 1. 0xC1340000

1 | 100 0001 0 | 011 0100 0000 0000 0000 0000

S E M

S = 1

E = 1000 0010 – 127 = 3

M = 011 0100 0000… = ¼ + 1/8 + 1/32 + 1= 45/32

(-1)1 \* 45/32 \* 23 = -11.25

1. Convert the following decimal numbers to hex encoded as IEEE 754 single-precision floating-point numbers:
   1. -1.0

1 = 0 \* 2 + 1 0.0 \* 2 = 0.0

1.0 x 20

|  |  |  |
| --- | --- | --- |
| S | E | M |

1 8 23

S = 1

E = 0 – (-127) = 127 🡪 0111 1111

M = 0000…

1 | 011 1111 1 | 000 0000 0000 0000 0000 0000

0xBF800000

* 1. 16.75

16 = 8 \* 2 + 0 0.75 \* 2 = 1.5

8 = 4 \* 2 + 0 0.5 \* 2 = 1.0

4 = 2 \* 2 + 0

2 = 1 \* 2 + 0

1 = 0 \* 2 + 1

10000.11 🡪 1.000011 x 24

S = 0

E = 4 + 127 = 131 🡪 1000 0011

M = 0000 1100 0000…

0 | 100 0001 1 | 000 0110 0000 0000 0000 0000

0x41860000

* 1. -314.0

314 = 157 \* 2 + 0

157 = 78 \* 2 + 1

78 = 39 \* 2 + 0

39 = 19 \* 2 + 1

19 = 9 \* 2 + 1

9 = 4 \* 2 + 1

4 = 2 \* 2 + 0

2 = 1 \* 2 + 0

1 = 0 \* 2 + 1

100111010.0 🡪 1.001110100 x 28

S = 1

E = 8 + 127 = 135 🡪 1000 0111

M = 0011 1010 0000…

1 | 100 0011 1 | 001 1101 0000 0000 0000 0000

0xC39D0000