Q1) Convert the following binary to real decimals:

1) 11.11

3.75

1/2 = .5
1/4 = .25
1/8 = .125
1/16 = .0625

Q2) Convert the following decimal to binary:

1) 1.5

1.1

Q3) Convert the following decimal to the IEEE Floating-point Standard:

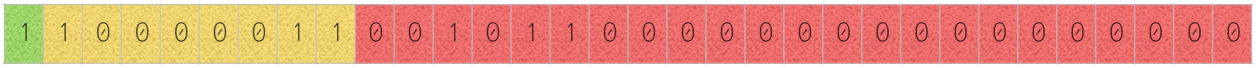
-18.75

-18.75 = - 10010.11 = $1.001011 * 2^4$

Exponent: 4 + 127 (bias) = 131 = 10000011

Sign bit is 1 (negative number)

Significand is 001011



Q4) Convert the following binaries to the IEEE Floating-point Standard:

A) 1110001010.1110010010010010

First thing we place in normalized scientific notation

1110001010.1110010010010010 = $1.11000101011100100100100 1 * 2^9$

Since significand is more than 23 bits, we can say that this number cannot be stored in the IEEE Floating-point representation.

Another correct solution would be to approximate the number by only using the 23 left-most bits and truncating the rest:

Exponent: 9 + 127 (bias) = 136 = 10001000

Sign bit is 0 (positive number)

Significand is 11000010101110010010010~~0~~1

B) .0000010101101 * 2^{-125}

First thing we place in normalized scientific notation

.0000010101101 * 2^{-125} = 1.0101101 * 2^{-131}

Since the exponent of 2 is less than or equal to -127, we need to use the denormalized notation:

1.0101101 * 2^{-131} = .000010101101 * 2^{-126}

Exponent is all 0s (since this is the demoralized notation)

Sign bit is 0 (positive number)

Significand is 000010101101

Q5) List the two locality principles used in the cache and briefly explain how they are exploited in the cache to save time.

Revisit slides for the answer to this questions.