

CS2100 Notes

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1 Week 1

1.1 Base- n Number Systems

1.1.1 Integer Decimal to Base- n Conversion

Repeated division by n , remainder forms the n -digit of the number in base- n .

1.1.2 Fractional Decimal to Base- n Conversion

Repeated multiplication by n , ones-place forms the n -digit of the number in base- n .

1.2 Number Representation Schemes

1.2.1 Sign and Magnitude

MSB is sign bit, 0 denotes positive, 1 denotes negative. Remaining bits form the magnitude.

1.2.2 One's Complement

MSB is sign bit, 0 denotes positive, 1 denotes negative. Negative numbers by inversion of all bits. Arithmetic done by adding carry-out of MSB back into sum.

1.2.3 Two's Complement

MSB is sign bit, 0 denotes positive, 1 denotes negative. Negative numbers by inversion of all bits, followed by addition of 1. Arithmetic done by ignoring carry out of MSB.

1.2.4 Excess- n Representation

Number N represents value $N - n$. For example, 000 in excess-4 representation represents $0 - 4 = -4$.

1.3 Real Number Representations

1.3.1 IEEE-754 Float

MSB is sign bit, 0 denotes positive, 1 denotes negative. Next 8 bits are exponent bits, represented in excess-127. Next 23 bits are magnitude bits, normalised with implicit leading bit of 1. $x = (-1)^S * M * 2^{(E-127)}$

2 Week 2