Unsigned Binary

- $Value = \sum_{i=0}^{n-1} b_i \times 2^i$
- Positional number system
- $Maximum = 2^n - 1$
- $Minimum = 0$
- $\Delta r = 1$

Two's Complement

- $Value = -b_{n-1} \times 2^{n-1} + \sum_{i=0}^{n-2} b_i \times 2^i$
- Positional number system
- $Maximum = 2^{n-1} - 1$
- $Minimum = -2^{n-1}$
- $\Delta r = 1$
- Circular Nature

Fixed Point

- Can be used with Unsigned Binary or Two's Complement
- Include radix point p digits to left of integer position
- Value = $(Value_{UB}) \times r^{-p}$ or $(Value_{2C}) \times r^{-p}$
- Positional number system
- $\Delta r = r^{-p}$

Excess Code

- $Value = StoredVal_{UB} - Excess$
- Excess is application dependent
- Not positional number system
- $\Delta r = 1$
- $Maximum = MaxVal_{UB} - Excess$
- $Minimum = -Excess$
- Some patterns can have special significance
- Common applications: Excess-3 BCD system, also exponent storage in FPNS

Floating Point Number System

- Based on scientific notation
- $Value = (-1)^S \times M \times r_s^E$
- S – sign bit (number stored in sign-magnitude fashion)
- M – mantissa; stored as fixed point num, p usually k or $k-1$ where k digits in mantissa
- E – exponent; stored in excess code
- Storage method: S E M
- Definitely not a positional number system
- Not all patterns are legal numbers
- Concept of normalization
- $Maximum = MaxMan \times r_s^{MaxExp}$
- $Minimum = MinMan \times r_s^{MostNegExp}$