

2. Normal numbers: Floating point numbers represent according to IEEE 754 standard with a leading 1 before the binary point.

$$\text{Representation } (-1)^s \times 1.m \times 2^{e+127}$$

Smallest number possible to represent:

$$1.000 \dots 2^{-126} \quad (\text{Positive})$$

$$e = 11111110$$

note: last bit of exponent cannot be 1, All 1's represents NaN.

Largest number possible to represent.

$$1.111 \dots \times 2^{127} \quad (\text{Positive})$$

Subnormal numbers: Floating point numbers with a leading 0 and biased exponent '0' (bias is 126, actual exponent is -126).

$$\text{Representation: } (-1)^s \times 0.m \times 2^{-126}$$

Smallest number possible to represent:

$$2^{-23} \times 2^{-126} = 2^{-149}$$

Largest number: $0.1111 \dots 2^{-126}$

Subnormal numbers are used to represent very small numbers.

