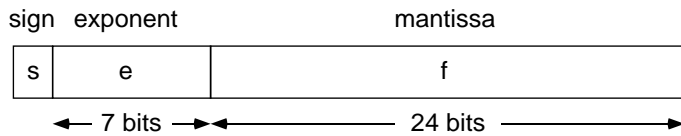
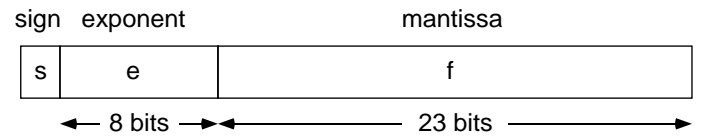


IBM System 360/370 Floating Point



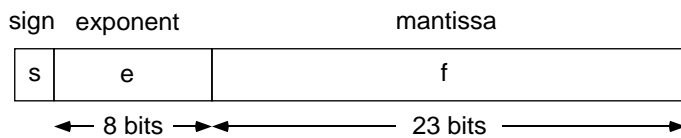
- value = $(-1)^s 0.f \times 16^{e-64}$
 - Sign bit is 0 for positive number, 1 for negative number
 - Mantissa represented as a fractional value, using signed magnitude
 - Normalized to have leading zero
 - Exponent represented using excess 64 (base assumed to be 16)
- $7.6875_{10} = 111.1011_2$
 $= 0.01111011_2 \times 16^1$
 $= 0.01111011_2 \times 16^{65-64}$
 $= 0\ 100001\ 011101100000\dots 0_{\text{IBM 360 fp}}$

DEC PDP 11 & Vax Floating Point



- value = $(-1)^s 0.1f \times 2^{e-128}$
 - Sign bit is 0 for positive number, 1 for negative number
 - Mantissa represented as a fractional value, using signed magnitude
 - Normalized to begin with 0.1
 - Leading "1" is assumed, and is not explicitly stored (called a *hidden bit*)
 - Exponent represented using excess 128 (base assumed to be 2)
- $7.6875_{10} = 111.1011_2$
 $= 0.1111011_2 \times 2^3$
 $= 0.1111011_2 \times 2^{131-128}$
 $= 0\ 1000011\ 11101100000\dots 0_{\text{DEC fp}}$

IEEE 754 Floating Point Standard



- value = $(-1)^s 1.f \times 2^{e-127}$
 - Sign bit is 0 for positive number, 1 for negative number
 - Mantissa represented as a fractional value, using signed magnitude
 - Normalized to begin with 1.xxxxx
 - Leading "1" is assumed, and is not explicitly stored (called a *hidden bit*)
 - Base assumed to be 2
 - Exponent represented using excess 127
- $7.6875_{10} = 111.1011_2$
 $= 1.111011_2 \times 2^2$
 $= 1.111011_2 \times 2^{129-127}$
 $= 0\ 1000001\ 11101100000\dots 0_{\text{IEEE fp}}$

Table 8.2 The IEEE 754 and DEC floating point formats

s	e	f	IEEE	DEC
1	1 ... 11	1 ... 11		numbers
⋮	⋮	⋮	NaN	
1	1 ... 11	0 ... 01		
1	1 ... 11	0 ... 00	$-\infty$	numbers
1	1 ... 10	1 ... 10		
⋮	⋮	⋮	numbers	reserved
1	0 ... 01	1 ... 01		
1	0 ... 00	1 ... 11		
⋮	⋮	⋮	denormals	
1	0 ... 00	0 ... 01		
1	0 ... 00	0 ... 00	-0	0
0	0 ... 00	0 ... 00	$+0$	
0	0 ... 00	0 ... 01	denormals	
⋮	⋮	⋮		numbers
0	0 ... 00	1 ... 11		
0	0 ... 01			
⋮	⋮	anything	numbers	
0	1 ... 10			
0	1 ... 11	0 ... 00	$+\infty$	numbers
0	1 ... 11	0 ... 01		
⋮	⋮	⋮	NaN	
0	1 ... 11	1 ... 11		

