(c) 486.7 10 3 1 $= 10^3 - 10^{-1} - 486.7$
$= 1000 - 0.1 - 486.7$
$= 999.9 - 486.7 = 513.2$

From Example 1.33 it can be seen that the ones complement of a number is obtained by subtracting each digit from the largest digit in the number system. In the binary system, this is equivalent to complementing (i.e., changing 1 to 0 and 0 to 1) each bit of the given number.

Example 1.34

$$N = 10110.110$$

$$\text{Ones complement of } N = \begin{array}{r} 11111.111 \\ -\,10110.110 \\ \hline 01001.001 \end{array}$$

which can also be obtained by complementing each bit of N.

As in sign-magnitude representation, a sign bit is included in the representation of numbers in complement systems as well. Because the complement of a number corresponds to its negative, positive numbers that are represented in complement systems remain in the same form as in the sign-magnitude system. Only negative numbers are represented in the complement form as shown by the following example.

Example 1.35

Here we assume that five bits are available for representation and that the MSB is the sign bit.

Decimal	Sign-magnitude	Twos complement	Ones complement
+5	0,0101	0,0101	0,0101
−5	1,0101	1,1011	1,1010
+4	0,0100	0,0100	0,0100
−4	1,0100	1,1100	1,1011

To obtain the complement of a number, we can start with the sign-magnitude form of the corresponding positive number and adopt the complementing procedures discussed here. In Example 1.35, the sign bit is separated from the magnitude bits by a "," for illustration purposes only. This separation is not necessary in complement systems since the sign bit also participates in the arithmetic as though it were a magnitude bit (as we will see later in this section).

Table 1.6 The Three Representation Schemes

Decimal	Sign-magnitude	Twos complement	Ones complement
+15	01111	01111	01111
+14	01110	01110	01110
+13	01101	01101	01101
+12	01100	01100	01100
+11	01011	01011	01011
+10	01010	01010	01010
+9	01001	01001	01001
+8	01000	01000	01000
+7	00111	00111	00111
+6	00110	00110	00110
+5	00101	00101	00101
+4	00100	00100	00100
+3	00011	00011	00011
+2	00010	00010	00010
+1	00001	00001	00001
+0	00000	00000	00000
−0	10000	00000	11111
−1	10001	11111	11110
−2	10010	11110	11101
−3	10011	11101	11100
−4	10100	11100	11011
−5	10101	11011	11010
−6	10110	11010	11001
−7	10111	11001	11000
−8	11000	11000	10111
−9	11001	10111	10110
−10	11010	10110	10101
−11	11011	10101	10100
−12	11100	10100	10011
−13	11101	10011	10010
−14	11110	10010	10001
−15	11111	10001	10000
−16		10000*	

* Twos complement uses 10000 to expand the range to (−16).

Table 1.6 shows the range of numbers that can be represented in five bits, in the sign-magnitude, twos complement, and ones complement systems. Note that the sign-magnitude and ones complement systems have two representations for 0 (+0 and −0), whereas the twos complement system has a unique representation for 0. Note also the use of the