1.3

000000000000 000000000000 000000000000 111111111111
010101010101 000000000000 000000000000 111111111111
111111111111

1.7

(b) $2^6 = 64$

(e) 10111011001 ※ # of '1' is more than # of '0'

Let S be 10111011001. Let S' be 11111111111.

Then $S = S' - 2^9 - 2^5 - 2^2 - 2^1$.

$S' = 2^{11} - 1$ Therefore, $3 \cdot 2^9 - 3 - (2^3+1) \cdot 2^2 = 511 \cdot 3 - 36 = 1497$

Another solution:
decimal = 2^0 + 2^3+ 2^4 + 2^6 + 2^7 + 2^8 + 2^10
= 1 + 8 + 16 + 64 + 128 + 256 + 1024
= 1497

1.10

(a)
$$\begin{array}{r} 19 \\ -16 \\ \hline 3 \\ -2 \\ \hline 1 \end{array}$$
10011

(c)
$$\begin{array}{r} 64 \\ -64 \\ \hline 0 \end{array}$$
1000000

1.14

(b)
2 | 65
2 | 32 … 1
2 | 16 … 0
2 | 8 … 0
2 | 4 … 0
2 | 2 … 0
1 … 0

1000001

(d)
2 | 100
2 | 50 … 0
2 | 25 … 0
2 | 12 … 1
2 | 6 … 0
2 | 3 … 0
1 … 1

1100100

1.18

(b) $\underbrace{1100}\,\underbrace{1000} = C8$

(d) $\underline{0110}\,\underline{0110}\,\underline{0110}\,\underline{1101} = 336D$

1.21

(a) 1011000011000100 (c) 1111000000000010

1.22

(b) $F0A2 = 15 \times 16^3 + 10 \times 16^1 + 2 \times 16^0 = 162 + 16^4 - 16^3 = 65536 - 4096 + 162 = 61602$

(d) $100 = 16^2 = 2^8 = 256$

1.25

(e) in binary $2^n \geq 999{,}999$ $\langle$1k = 1024, 1M = 1024k$\rangle$ $1M = 2^{20}$

$\therefore$ n should be 20 digits

in octal $8^n = 2^{3n}$ $\therefore$ 7 digits, in decimal, 6 digits

in hexa $16^n = 2^{4n}$ $\therefore$ 5 digits.