

# Solution for Homework 1

## Graded Homework:

<https://web.ugreen.cloud/web/#/share/2508afb1debd4b478bcb9c051205f831> 提取码: A49T

6. (a)  $100001 = 1 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 33$   
 (b)  $100111 = 1 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 = 39$   
 (c)  $101010 = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 42$   
 (d)  $111001 = 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 57$

或 (a) 14 (b) 10 (c) 28 (d) 16

12. (a)  $0.32 \cong 0.00 + 0.25 + 0.0625 + 0.0 + 0.0 + 0.0078125 = 0.0101001$   
 (b)  $0.246 \cong 0.0 + 0.0 + 0.125 + 0.0625 + 0.03125 + 0.015625 = 0.001111$

或 (a)  $0.26 = 0.01000010$  (b)  $0.762 = 0.1100001101$

14. (a)  $0.76 \times 2 = 1.52$  1 (MSB)  
 $0.52 \times 2 = 1.04$  1  
 $0.04 \times 2 = 0.08$  0  
 $0.08 \times 2 = 0.16$  0  
 $0.16 \times 2 = 0.32$  0  
 $0.32 \times 2 = 0.64$  0  
 continue if more accuracy is desired  
 0.110000  
 (b)  $0.456 \times 2 = 0.912$  0 (MSB)  
 $0.912 \times 2 = 1.824$  1  
 $0.824 \times 2 = 0.648$  1  
 $0.648 \times 2 = 1.296$  1  
 $0.296 \times 2 = 0.592$  0  
 continue if more accuracy is desired  
 0.01110

或 (a) 0.111110 (b) 0.0101100

16. (a)  $\begin{array}{r} 10 \\ -01 \\ \hline 01 \end{array}$  (b)  $\begin{array}{r} 100 \\ -11 \\ \hline 001 \end{array}$  (c)  $\begin{array}{r} 110 \\ -100 \\ \hline 010 \end{array}$   
 (d)  $\begin{array}{r} 1111 \\ -11 \\ \hline 1100 \end{array}$  (e)  $\begin{array}{r} 1101 \\ -101 \\ \hline 1000 \end{array}$  (f)  $\begin{array}{r} 110000 \\ -1111 \\ \hline 100011 \end{array}$

或 (d) 1011 (e) 0011 (f) 00011

18. (a)  $\frac{110}{11} = 10$  (b)  $\frac{1010}{10} = 101$  (c)  $\frac{1111}{101} = 11$

22. Take the 1's complement and add 1:

- (a)  $00 + 1 = 01$  (b)  $001 + 1 = 010$   
 (c)  $0101 + 1 = 110$  (d)  $0110 + 1 = 0111$   
 (e)  $010101 + 1 = 10110$  (f)  $00110 + 1 = 00111$   
 (g)  $00110011 + 1 = 110100$  (h)  $00111000 + 1 = 0011001$

或 (e) 00100 (f) 01101 (g) 01010000 (h) 11000011

28. (a)  $10011001 = -(1100111) = -103$   
 (b)  $01110100 = +(1110100) = +116$   
 (c)  $10111111 = -(1000001) = -65$

30. (a)  $11000000101001001110001000000000$   
 Sign = 1  
 Exponent =  $10000001 = 129 - 127 = 2$   
 Mantissa =  $1.01001001110001 \times 2^2 = 101.001001110001$   
 $-101.001001110001 = -5.15258789$

32. (a) 
$$\begin{array}{r} 00010110 \\ + 00110011 \\ \hline 01001001 \end{array}$$
 (b) 
$$\begin{array}{r} 01110000 \\ + 10101111 \\ \hline 100011111 \end{array}$$

或 (b) 00011111

38. (a)  $1111 = F_{16}$   
 (b)  $1011 = B_{16}$   
 (c)  $11111 = 1F_{16}$   
 (d)  $1010\ 1010 = AA_{16}$   
 (e)  $10101100 = AC_{16}$   
 (f)  $10111011 = BB_{16}$

或 (a) E(16) (b) A6(16)

42. (a)  $60_{16} - 39_{16} = 27_{16}$   
 (b)  $A5_{16} - 98_{16} = D_{16}$

或 8E(16)

44. (a)  $\frac{23}{8} = 2, \text{ remainder} = 7 \text{ (LSD)}$   
 $\frac{2}{8} = 0, \text{ remainder} = 2$   
 octal number =  $27_8$
- (b)  $\frac{45}{8} = 5, \text{ remainder} = 5 \text{ (LSD)}$   
 $\frac{5}{8} = 0, \text{ remainder} = 5$   
 octal number =  $55_8$

- (g)  $\frac{654}{8} = 81, \text{ remainder} = 6 \text{ (LSD)}$   
 $\frac{81}{8} = 10, \text{ remainder} = 1$   
 $\frac{10}{8} = 1, \text{ remainder} = 2$   
 $\frac{1}{8} = 0, \text{ remainder} = 1$   
 octal number =  $1216_8$

或 (a) 33(8) (b) 333(8)

46. (a)  $100 = 4_8$  (e)  $11001 = 31_8$   
 (b)  $110 = 6_8$  (f)  $11110 = 36_8$   
 (c)  $1100 = 14_8$  (g)  $110011 = 63_8$   
 (h)  $101010 = 52_8$  或 (e)  $14(8)$  (h)  $2603(8)$

50. (a)  $0001 = 1$  (b)  $0110 = 6$   
 (c)  $1001 = 9$  (d)  $0001\ 1000 = 18$   
 (e)  $0001\ 1001 = 19$  (f)  $0011\ 0010 = 32$   
 (g)  $0100\ 0101 = 45$  (h)  $1001\ 1000 = 98$   
 (i)  $1000\ 0111\ 0000 = 870$

52. (a) 
$$\begin{array}{r} 0010 \\ + 0001 \\ \hline 0011 \end{array}$$
 (b) 
$$\begin{array}{r} 0101 \\ + 0011 \\ \hline 1000 \end{array}$$
 (c) 
$$\begin{array}{r} 0111 \\ + 0010 \\ \hline 1001 \end{array}$$
  
 (d) 
$$\begin{array}{r} 1000 \\ + 0001 \\ \hline 1001 \end{array}$$
 (e) 
$$\begin{array}{r} 00011000 \\ + 00010001 \\ \hline 00101001 \end{array}$$
 (f) 
$$\begin{array}{r} 01100100 \\ + 00110011 \\ \hline 10010111 \end{array}$$

60. 
$$\begin{array}{cccccccc} 1001000 & 1100101 & 1101100 & 1101100 & 1101111 & 0101110 & 0100000 & \\ \mathbf{H} & \mathbf{e} & \mathbf{l} & \mathbf{l} & \mathbf{o} & . & \mathbf{\#} & \\ 1001000 & 1101111 & 1110111 & 0100000 & 1100001 & 1110010 & 1100101 & \\ \mathbf{H} & \mathbf{o} & \mathbf{w} & \mathbf{\#} & \mathbf{a} & \mathbf{r} & \mathbf{e} & \\ 0100000 & 1111001 & 1101111 & 1110101 & 0111111 & & & \\ \mathbf{\#} & \mathbf{y} & \mathbf{o} & \mathbf{u} & \mathbf{?} & & & \end{array}$$

或 (a)  $110100100$  (b)  $000001001$  (c)  $111111110$