P2-1. Binary to Decimal

a. (01101)2 = 1 x 2^3 + 1 x 2^2 + 1 x 2^0 = 13

b. (1011000)2 = 1 x 2^6 + 1 x 2^4 + 1 x 2^3= 88

c. (011110.01)2 = 1 x 2^4 + 1 x 2^3 + 1 x 2^2 + 1 x 2^1 + 2^(-2) = 30.25

d. (111111.111)2 = 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 + 2^(-1) + 2^(-2) + 2^(-3) = 63.875

P2-2. Hexadecimal to Decimal

a. (AB2)16 = 10 x 16^2 + 11 x 16^ 1 + 2 x 16^0 = 2738

b. (123)16 = 16^2 + 2 x 16^1 + 3 x 16^0 = 291

c. (ABB)16 = 10 x 16^2 + 11 x 16^1 + 11 x 16^0 = 2747

d. (35E.E1)16 = 3 x 16^2 + 5 x 16^1 + 14 x 16^0 + 14 x 16^(-1) + 16^(-2) = 862.878

P2-3. Octal to Decimal

a. (237)8 = 2 x 8^2 + 3 x 8^1 + 7 x 8^0 = 159

b. (2731)8 = 2 x 8^3 + 7 x 8^2 + 3 x 8^1 + 8^0 = 1497

c. (617.7)8 = 6 x 8^2 + 8^1 + 7 x 8^0 + 7 x 8^(-1) = 399.875

d. (21.11)8 = 2 x 8^1 + 8^0 + 8 ^(-1) + 8^(-2) = 17.140

P2-4. Octal to Binary

a. 1234

0 <- 1 <- 2 <- 4 <- 9 <- 19 <- 38 <- 77 <- 154 <- 308 <- 617 <- 1234

1 0 0 1 1 0 1 0 0 1 0

==> 1234 = (1001101001)2

b. 88

0 <- 1 <- 2 <- 5 <- 11 <- 22 <- 44 <- 88

1 0 1 1 0 0 0

=>> 88 = (1011000)2

c. 124.02

0 <- 1 <- 3 <- 7 <- 15 <- 31 <- 62 <- 124 . 0.2 -> 0.4 -> 0.8 -> 0.6

1 1 1 1 1 0 0 . 0 0 1

==> 124.02 = (1111100.001)2

d. 14.56

0 <- 1 <- 3 <- 7 <- 14 . 0.56 -> 0.12 -> 0.24 -> 0.48

1 1 1 0 . 1 0 0

==> 14.56 = (1110.100)2

P2-5. Decimal to Octal

a. 1156

0 <- 2 <- 18 <- 144 <- 1156

2 2 0 4

==> 1156 = (2204)8

b. 99

0 <- 1 <- 12 <- 99

1 4 2

==> 99 = (124)8

c. 11.4

0 <- 1 <- 11 . 0.4 -> 0.2 -> 0.6 -> 0.8

1 3 . 3 1 4

==> 11.4 = (13.314)8

d. 72.8

0 <- 1 <- 9 <- 72 . 0.8 -> 0.4 -> 0.2 -> 0.6

1 1 0 . 6 3 1

==> 72.8 = (110.631)2

P2-6. Decimal to Hexadecimal

a. 567

0 <- 2 <- 35 <- 567

2 3 7

==> 567 = (237)16

b. 1411

0 <- 5 <- 88 <- 1411

5 8 3

==> 1411 = (583)16

c. 12.13

0 <- 12 . 0.13 -> 0.08 -> 0.28 -> 0.48

12 . 2 1 4

==> 12.13 = ( D.214)16

d. 16

0 <- 1 <- 16

1 0

==> 16 = (10)16

P2-7. Octal to Decimal

a. (514)8

5 = 101

1 = 001

4 = 100

==> (514)8 = 1 0100 1100 = (14C) 16

b. (411)8

4 = 100

1 = 001

1 = 001

==> (411)8 = 1 0000 1001 = (109)16

c. (13.7)8

1 = 001

3 = 011

7 = 111

==> (13.7)8 = 00 1011.111 = (B.7) 16

d. (1256)8

1 = 001

2 = 010

5 = 101

6 = 110

==> (1256)8 = 0010 1010 1110 = (2AC)16

P2-8. Hexadecimal to Decimal

a. (51A)16

5 = 0101

1 = 0001

A = 1010

==> (51A)16 = 010 100 011 010 = (2432)8

b. (4E1)16

4 = 0100

E = 1110

1 = 0001

==> (4E1)16 = 010 011 100 001 = (2341)8

c. (BB.C)16

B = 1011

B = 1011

C = 1100

==> (BB.C)16 = 10 111 011 . 1 100 = (273.14)8

d. (ABC.D)16

A = 1010

B = 1011

C = 1100

D = 1101

==> (ABC.D)16 = 101 010 111 100 . 1 101 = (527.15)8

P2-9. Binary to Octal

a. (01101)2 = (15)8

b. (101 1000)2 = (510)8

c. (01 1110.01)2 = (116.1)8

d. (11 1111.111)2 = (1317.7)8

P2-10. Binary to Hexadecimal

a. (0 1101)2 = (D)16

b. (101 1000)2 = (58)16

c. (01 1110.01)2 = (1C)16

d. (11 1111.111)2 = (3F)16

P2-11. Decimal to Binary

a. 121

0 <- 1 <- 3 <- 7 <- 15 <- 30 <- 60 <- 121

1 1 1 1 0 0 1

==> 121 = (1111001)2

b. 78

0 <- 1 <- 2 <- 4 <- 9 <- 19 <- 39 <- 78

1 0 0 1 1 1 0

==> 78 = (1001110)2

c. 255

0 <- 1 <- 3 <- 7 <- 15 <- 31 <- 63 <- 127 <- 255

1 1 1 1 1 1 1 1

==> 255 = (11111111)2

d. 214

0 <- 1 <- 3 <- 6 <- 13 <- 26 <- 53 <- 107 <- 214

1 1 0 1 0 1 1 0

==> 214 = (11010110)2

P2-12. Decimal to Binary

a. 3 5/8

5/8 = 4/8 + 1/8 = 2^(-1) + 2^(-3)

==> 3 5/8 = (11.101)2

b. 12 3/32

3/32 = 2/32 + 1/32 = 2^(-4) + 2^(-5)

==> 12 3/32 = (1100.00011)2

c. 4 13/64

13/64 = 3/16 + 1/64 = 1/8 + 1/16 + 1/64 = 2^(-3) + 2^(-4) + 2^(-6)

==> 4 13/64 = (100.001101)2

d. 12 5/128

5/128 = 1/32 + 1/128 = 2^(-5) + 2^(-7)

==> 4 13/64 = (1100.0000101)2

P2-13.

a. Binary:

b. Decimal:

c. Hexadecimal:

d. Octal:

P2-14.

a. Five-digit decimal number converted to binary:

b. Four-digit decimal converted to octal:

c. Seven-digit decimal converted to hexadecimal:

P2-15.

a. 5-bit binary number converted to decimal:

b. Three-digit octal number converted to decimal:

c. Three-digit hexadecimal converted to decimal:

P2-16.

a. 0.1875 = 0.125 + 0.0625 = 1/2 + 1/16

b. 0.640625 = 0.5 + 0.140625 = 0.5 + 0.125 + 0.015625 = 1/2 + 1/8 + 1/64

c. 0.40625 = 0.25 + 0.15625 = 0.25 + 0.125 + 0.03125 = 1/4 + 1/8 + 1/32

d. 0.375 = 0.25 + 0.125 = 1/4 + 1/8

P2-17. Decimal to Binary

a. 7.1875 = 7 + 0.1875 = 111.1001

b. 12.640625 = 12 + 0.640625 = 1100.101001

c. 11.40625 = 11 + 0.40625 = 1011.01101

d. 0.375 = 0.011

P2-18.

a. b = 10, K = 10 => Max = 10^10 – 1 = 9 999 999 999

b. b = 2, K = 12 => Max = 2^12 – 1 = 4 095

c. b = 8, K = 8 => Max = 8^8 – 1 = 16 777 215

d. b = 16, K = 7 => Max = 16^7 – 1 = 268 435 455

P2-19.

a. less than 1000 => x = 3 x log10/log2 = 10

b. less than 100 000 => x = 5 x log10/log2 = 17

c. less than 64 => x = 6

d. less than 256 => x= 8

P2-20.

a. Integers less than 214 in binary: 14

b. Integers less than 108 in decimal: 8

c. Integers less than 813 in octal: 13

d. Integers less than 164 in hexadecimal: 4