Practical - 2

1. Binary to Decimal.

(a) 0101_2

~~0x2^0 + 1x2^0 + 0x2^1 + 1x2~~

$1 \times 2^0 + 0 \times 2^1 + 1 \times 2^2 + 0 \times 2^3$

$1 + 0 + 4 + 0$

$= 5_{10}$ ✓

(b) 0111_2

$0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$

$0 + 4 + 2 + 1$

$= 7_{10}$ ✓.

(C). 0011_2

$0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$

$2 + 1$

$= 3.$

(2)

(d) 1001_2 ↓

$1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$

$8 + 1$

$= 9_{10}$ ✓.

(e) 1011_2 ↓

$1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$

$8 + 0 + 2 + 1$

$= 11_{10}$ ✓.

(f) 1111_2 ↓

$1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$

$8 + 4 + 2 + 1$

15_{10} ✓

(g) 0000_2 ↓

$0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0$

$0 + 0 + 0 + 0 = 0_{10}$ ✓.

(3)

(b) 1101_2 ↓

$1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$

$8 + 4 + 0 + 1$

$= 13_{10}$ ✓

2. Conversion Binary to Decimal

(a) 00010101_2 ↓

→ $0 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2$

$+ 0 \times 2^1 + 1 \times 2^0$

→ $16 + 4 + 1$

→ 21_{10} ✓.

(b) 10110101_2 ↓

$1 \times 2^7 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^2 + 1 \times 2^0$

$128 + 32 + 16 + 4 + 1$

181_{10} ✓.

(4)

(c) 11010011_2

$= 1\times2^7 + 1\times2^6 + 0\times2^5 + 1\times2^4 + 0\times2^3 + 0\times2^2 + 1\times2^1 + 1\times2^0$

$= 128 + 64 + 16 + 3$

$= 211_{10}$ ✓

(d) 01101000_2

$\rightarrow 1\times2^6 + 1\times2^5 + 1\times2^3$

$= 64 + 32 + 8$

$= 104_{10}$ ✓

Q3 Binary to decimal

Q1 1011010100010101

~~$= 0\times2^{15} + 1\times2^{14} + 1\times2^{13} + 1\times2$~~

$= 1\times2^{15} + 1\times2^{13} + 1\times2^{12} + 1\times2^{10} + 1\times2^8 + 1\times2^4 + 1\times2^2 + 1\times2^0$

$32768 + 8192 + 4096 + 1024 + 256 + 16 + 4 + 1 = 46357_{10}$ ✓.

(5)

(b) 01101000 11001011

→ $1 \times 2^{14} + 1 \times 2^{13} + 1 \times 2^{10} + 1 \times 2^{7} + 1 \times 2^{6} + 1 \times 2^{4} + 1 \times 2^{1}$

$+ 1 \times 2^{0}$

→ 16384 + 8192 + 2048 + 128 + 64 + 16 + 2 + 1

= 26,835

Q3 True / false.

(a) $1001_2 < 5_{10}$ false

(b) $0111_2 = 1111_{10}$ false

(c) $0011_2 > 2_{10}$ True

(d) $1001_2 > 1101_2$ false

(e) $1011_2 = 11_{10}$ True

(f) $1111_2 = 15_{10}$ True

(g) $0000_2 < 0_{10}$ As. 0=0 false

(h) $1101_2 > 1010_2$. True