Digital Logic Design HW Answer

【Unit 1 & Unit 2】

1.1

(a)

$$757.25_{10} = 2F5.40_{16}$$
$$= \underline{0010}\ \underline{1111}\ \underline{0101}.\underline{0100}\ \underline{0000}_2$$

(b)

$$123.17_{10} = 7B.2B_{16}$$
$$= \underline{0111}\ \underline{1011}.\underline{0010}\ \underline{1011}_2$$

(c)

$$356.89_{10} = 164.E3_{16}$$
$$= \underline{0001}\ \underline{0110}\ \underline{0100}.\underline{1110}\ \underline{0011}_2$$

(d)

$$1063.5_{10} = 427.8_{16}$$
$$= \underline{0100}\ \underline{0010}\ \underline{0111}.\underline{1000}_2$$

1.2

(a) $EB1.6_{16}$, 3761.375_{10}

(b) $59D.C_{16}$, 1437.75_{10}

1.7

2's complement.

(a) Overflow

(b) Overflow

(c) 111001

(d) 000001

(e) 100000

1's complement

(a) Overflow

(c) 111000

(d) 000001

(e) Overflow

1.17

	Add	Subtract	Multiply
(a)	11000	0110	10000111
(b)	10011111	110011	1011000100110
(c)	1001111	10101	10110101010

1.19 (a)

	Quotient	Remainder
(a)	101110	11
(b)	11011	111
(c)	1100	110

1.21

(a) base = 7. Overflow.

(b) base = 5. No overflow.

(c) base = 6. No overflow.

1.26

(a)

(b + 1)2 = b2 + 2b + 1 so (11b)2 = 121b if b > 2.

(b)

(b2 + b + 1)2 = b4 + 2b3 + 3b2 + 2b + 1 so

(111b)2 = 12321b if b > 3.

1.30

5-4-1-1 is not possible.

6-3-2-1 is possible.

1.44

Two positive numbers

No overflow: 0x…x + 0x…x = 0x…x

carry in = 0 = carry out

Overflow: 0x…x + 0x…x = 1x…x

carry in = 1, carry out = 0

Two negative numbers

No overflow: 1x…x + 1x…x = 1x…x

carry in = 1 = carry out

Overflow: 1x…x + 1x…x = 0x…x

carry in = 0, carry out = 1

A positive and a negative number

No overflow: 0x…x + 1x…x = 0x…x

carry in = 1 = carry out

No overflow: 0x…x + 1x…x = 1x…x

carry in = 0 = carry out

2.5

(a) $ACD' + BE$

(b) $A'B' + A'D' + C'B' + C'D'$

2.6

(a) $(A + C')\,(B + C')\,(A + D')\,(B + D')$

(b) $X(W + Z)\,(W + Y)$

(c) $(A' + E)\,(B + E)\,(C + E)\,(A' + F + D)\,(B + F + D)\,(C + F + D)$

(d) $Z(W' + X)\,(W' + Y + Q')$

(e) $(D' + A')\,(D' + C)$

(f) $(A + B + D)(A + C + D)(A + B + E)(A + C + E)$

2.13

(a) B

(b) $A' + B'$

(c) $(AB + C)'\,D$

(d) $A'B' + C' + D$

2.23

(a) $(W + U')(W + Y)(W + V)$

(b) $(T+U+V)(T+Y'+V)(W+U+V)(W+Y'+V)$

(c) $B'(E' + C)(E' + A' + D')$

(d) $A(B + D)(B + E')(C + F' + D)(C + F' + E')$

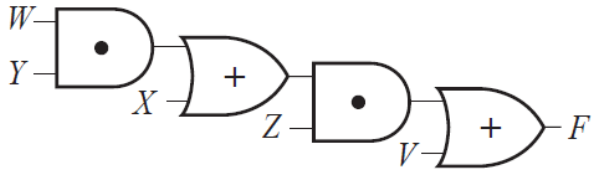
2.25

(a) $RP' + RQ' + S'$

(b) $X'Y' + X'Z'$

(c) $ABC' + ABD'$

2.27



2.30

$F = (X+Y')Z + X'YZ'$ (from the circuit)

$= (X+Y'+ X'YZ')(Z+X'YZ')$ (Distributive Law)

$= (X+Y'+X')(X+Y'+Y)(X+Y'+Z')(Z+X')(Z+Y)(Z+Z')$ (Distributive Law)

$= (1+Y')(X+1)(X+Y'+Z')(Z+X')(Z+Y)(1)$ (Complementation Laws)

$= (1)(1)(X+Y'+Z')(Z+X')(Z+Y)(1)$ (Operations with 0 and 1)

$= (X+Y'+Z')(Z+X')(Z+Y)$ (Operations with 0 and 1)

$G = (X +Y' + Z')(X' + Z)(Y + Z)$ (from the circuit)