

논리설계. 이문반 hw2.

#1.  $(a')' = a$  (involution)

$(a')$	
$= (a')' + 0$	(identity)
$= (a')' + a \cdot a'$	(complement)
$= (a')' + a) \cdot ((a')' + a')$	(distribute)
$= (a + (a')') \cdot (a' + (a')')$	(commutative)
$= (a + (a')') \cdot 1$	(complement)
$= (a + (a')') \cdot (a + a')$	(complement)
$= a + ((a')' \cdot a')$	(distribute)
$= a + 0$	(complement)
$= a$	(identity)

#2. Convert the following number from decimal to binary.

$$0.375 \times 2 = 0.75$$

$$0.75 \times 2 = 1.5$$

$$0.5 \times 2 = 1.0$$

$$0.375_{10} \Rightarrow 0.011_2$$

#3. Convert the following number from decimal  
to 2's complement binary

$$0.625 \times 2 = 1.25 \quad 11 \Rightarrow 1011_2$$

$$0.25 \times 2 = 0.5$$

$$0.5 \times 2 = 1.0 \quad \text{아니} \quad \text{아니}$$

$$11.625 = 01011.101_2$$

complement	10100.010
add 1	<div style="text-align: center;">1</div> <hr style="width: 100%;"/> 10100.011

$$\therefore \text{2's complement} = 10100.011$$

#4.

Prove that  $a \cdot a = a$ .

$$a \cdot a$$

$$= a \cdot a + 0$$

(identity)

$$= a \cdot a + a \cdot d$$

(complementary)

$$= a \cdot (a + d)$$

(distributive)

$$= a \cdot 1$$

(complementary)

$$= a$$

(identity)

$$\underline{\therefore a \cdot a = a}$$

#5.

Show that  $a'b' + a \cdot b + a' \cdot b = a' + b$ .

$$a'b' + a \cdot b + a' \cdot b$$

$$= a'b' + a \cdot b + a' \cdot b + a' \cdot b \quad (\text{idempotency})$$

$$= a'b' + a' \cdot b + a \cdot b + a' \cdot b \quad (\text{commutative})$$

$$= a'(b' + b) + b(a + a') \quad (\text{associative})$$

$$= a' \cdot 1 + b \cdot 1 \quad (\text{complementary})$$

$$= a' + b \quad (\text{identity})$$

$$\therefore \underline{a'b' + a \cdot b + a' \cdot b = a' + b}$$

#6.

$$f = (x \cdot y + w) \cdot z + (x + y) \cdot w$$

