

Truth Table in C

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- 1 Truth Table in C
 - Displaying Truth Table
 - Logical and Bitwise AND

Logical Equivalence Example (1)

```
#include <stdio.h>

#define p u.a.P
#define q u.a.Q
#define r u.a.R

#define n (1<<3)

struct atom {
    unsigned R:1;
    unsigned Q:1;
    unsigned P:1;
};

union utype {
    struct atom a;
    int i;
};

int main(void) {
    int i;
    union utype u;

    for (i=n-1; i>=0; --i) {
        u.i = i;
        printf("p=%d q=%d r=%d \n", p, q, r);
    }
    printf("\n");

    for (i=n-1; i>=0; --i) {
        u.i = i;
        printf("(%d,%d,%d)  ", p, q, r);
        printf("q&r=%d p|(q&r)=%d  ", q&r, p|(q&r));
        printf("p|q=%d p|r=%d ", p|q, p|r);
        printf("(p|q)&(p|r)=%d \n", (p|q)&(p|r));
    }
}
```

Logical Equivalence Example (2)

p=1 q=1 r=1
p=1 q=1 r=0
p=1 q=0 r=1
p=1 q=0 r=0
p=0 q=1 r=1
p=0 q=1 r=0
p=0 q=0 r=1
p=0 q=0 r=0

(1, 1, 1)	q&r=1	p (q&r)=1	p q=1	p r=1	(p q)&(p r)=1
(1, 1, 0)	q&r=0	p (q&r)=1	p q=1	p r=1	(p q)&(p r)=1
(1, 0, 1)	q&r=0	p (q&r)=1	p q=1	p r=1	(p q)&(p r)=1
(1, 0, 0)	q&r=0	p (q&r)=1	p q=1	p r=1	(p q)&(p r)=1
(0, 1, 1)	q&r=1	p (q&r)=1	p q=1	p r=1	(p q)&(p r)=1
(0, 1, 0)	q&r=0	p (q&r)=0	p q=1	p r=0	(p q)&(p r)=0
(0, 0, 1)	q&r=0	p (q&r)=0	p q=0	p r=1	(p q)&(p r)=0
(0, 0, 0)	q&r=0	p (q&r)=0	p q=0	p r=0	(p q)&(p r)=0

Logical and Bitwise AND (1)

```
#include <stdio.h>

int main(void) {

    unsigned char p = 0x46;
    unsigned char q = 0xE8;

    printf("logical AND \n");

    printf("1 means true \n");
    printf(" 0 && 0 = %d \n", 0 && 0);
    printf(" 0 && 1 = %d \n", 0 && 1);
    printf(" 1 && 0 = %d \n", 1 && 0);
    printf(" 1 && 1 = %d \n", 1 && 1);
    printf("\n");

    printf("non-zero value is considered as true \n");
    printf(" 0 && 0 = %d \n", 0 && 0);
    printf(" 0 && 11 = %d \n", 0 && 11);
    printf(" 22 && 0 = %d \n", 22 && 0);
    printf(" -1 && 9 = %d \n", -1 && 9);
    printf("\n");
```

Logical and Bitwise AND (2)

logical AND

1 means true

0 && 0 = 0

0 && 1 = 0

1 && 0 = 0

1 && 1 = 1

non-zero value is considered as true

0 && 0 = 0

0 && 11 = 0

22 && 0 = 0

-1 && 9 = 1

bitwise AND

p & q = 40 64

logical and bitwise NOT

!p = 0 0

~p = fffffffb9 -71