Logic and Computing Devices Cheat Sheet

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Common Conversions

2^{10}	10^3	Kilo
2^{20}	10^6	Mega
2^{30}	10^9	Giga
2^{40}	10^{12}	Tera

Information Display

K	10^3 bytes
Kib, KB (i=information)	2^{10} bytes

Number Formulas

Max value represented by an **n** bit number	2^n-1
Max value in range of fractions	$(2^n-1)/2^n$
n number of bits to represent number **x**	log(**x**)/log(2)
Digits to store **n** in binary	log(**n**)/log(2)
Digits to store **b** bit binary number in BCD	4x[log(2^b)] <-brackets are rounded up

Complements

(r-1)'s Complement of **n**, where **d** = number of digits	(r^d-1)-**n**
1's Complement	Complement each bit
2's Complement	Start from right until 1. Then, take complement.
For base R, R's complement of n	r^d-n

Signed Arithmetic

If the value is negative, take the 2's complement. Then, add both values together.

Sampling temps from -x to y. n bits per sample

y--x = **Z**	log(**Z**)/log(**n**) = **F**

Then use **F** as a base to find "binary" value

Boolean Algebra Rules

X+1=1	Annulment
X+0=0	Identity
X*1=X	Identity
X*0=0	Annulment
X+X=X	Idempotent
X*X=X	Idempotent
(X')' = X	Double Negation
X+X' = 1	Complement
X*X'=0	Complement
X+Y=Y+X	Commutative
X*Y*=Y*X*	Commutative
X'+X' = X'X'	deMorgan's Theorem
X'X' = X'+X'	deMorgan's Theorem
X+XY = X	Absorption
X(X+Y) = X	Absorption
Associative Law	Distributive Law

Can think of AND as series, and OR as parallel

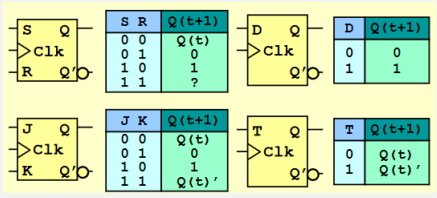
Cost Criteria

literals+non-single terms + unique complemented literals

Ex: ABCD+A'B'C'D'

(8) + (2) + (4) = 14

Flip Flop Characteristic Tables



Sequential Analysis

Write all of the inputs for each flip-flop. Make a state table.

State Reduction

If two states have the same inputs and outputs, you can remove one. Remember to change the variable if it appears elsewhere.

Counters

Synchronous Counters	have a common clock
Ring counter	circular shift register

Types of PLD's

No fishbones, 4x16 decoder	16x8 ROM
Fishbones, x's	PLA (Programmable Logic Array)
No fishbones, 2x4 decoder	4x2 ROM
Fixed ORs, same inputs	PAL (Programmable Array Logic)
When finding terms, if X on 1, NOT all terms	Else, find terms normally

Parity

EVEN Function	generates ODD parity
ODD Function	generates EVEN parity