



SOEN228 Midterm Cheat Sheet

System Hardware (Concordia University)



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Cheat Sheet

| A B | A AND B | A OR B | A XOR B | A NOR B | A NAND B |
|-----|---------|--------|---------|---------|----------|
| 00 | 0 | 0 | 0 | 1 | 1 |
| 01 | 0 | 1 | 1 | 0 | 1 |
| 10 | 0 | 1 | 1 | 0 | 1 |
| 11 | 1 | 1 | 0 | 0 | 0 |

| Clk | S | R | $Q(t+1)$ |
|-----|---|---|--------------------|
| 0 | x | x | $Q(t)$ (no change) |
| 1 | 0 | 0 | $Q(t)$ (no change) |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | x |

| Clk | D | $Q(t+1)$ |
|-----|---|----------|
| 0 | x | $Q(t)$ |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

| T | $Q(t+1)$ |
|---|--------------|
| 0 | $Q(t)$ |
| 1 | $\bar{Q}(t)$ |

| J | K | $Q(t+1)$ |
|---|---|--------------|
| 0 | 0 | $Q(t)$ |
| 0 | 1 | 0 |
| 1 | 0 | 1 |
| 1 | 1 | $\bar{Q}(t)$ |

| Name | Algebraic identity | |
|--------------|--|---|
| Commutative | $w + y = y + w$ | $wy = yw$ |
| Associative | $(w + y) + z = w + (y + z)$ | $(wy)z = w(yz)$ |
| Distributive | $w + yz = (w + y)(w + z)$ | $w(y + z) = wy + wz$ |
| Idempotent | $w + w = w$ | $ww = w$ |
| Involution | $\overline{\overline{w}} = w$ | |
| Complement | $w + \overline{w} = 1$ | $w\overline{w} = 0$ |
| de Morgan | $\overline{w + y} = \overline{w} \overline{y}$ | $\overline{wy} = \overline{w} + \overline{y}$ |
| | $1 + w = 1$ | $0 \cdot w = 0$ |
| | $0 + w = w$ | $1 \cdot w = w$ |

RISC-type addressing modes.

| Name | Assembler syntax | Addressing function |
|-------------------|------------------|----------------------|
| Immediate | #Value | Operand = Value |
| Register | R_i | $EA = R_i$ |
| Absolute | LOC | $EA = LOC$ |
| Register indirect | (R_i) | $EA = [R_i]$ |
| Index | $X(R_i)$ | $EA = [R_i] + X$ |
| Base with index | (R_i, R_j) | $EA = [R_i] + [R_j]$ |

EA = effective address

Value = a signed number

X = index value