MIPS Logical Operations

- Logical Operations
  - Boolean operations on values
  - AND, OR, XOR, NOR
- Operators are bitwise
  - Operate on multiple bits but individually
- Truth table for AND
  - c = a ^ b
  - c = a AND b
  - 0 = FALSE
  - 1 = TRUE

a	b	c
0	0	0
0	1	0
1	0	0
1	1	1

MIPS Logical Operations

- Truth table for OR
  - c = a | b
  - c = a OR b

a	b	c
0	0	0
0	1	1
1	0	1
1	1	1

- Truth table for XOR
  - Exclusive Or
  - c = a $\oplus$ b
  - c = 1 iff a $\neq$ b
  - c = a XOR b

a	b	c
0	0	0
0	1	1
1	0	1
1	1	0

MIPS Logical Operations

- Truth table for NOR
  - c = ~(a | b)
  - c = a NOR b

a	b	c
0	0	1
0	1	0
1	0	0
1	1	0

- Where did NOT go?
  - There is no NOT, but consider this
    - ~(a | 0) = ~(a) = ~a
    - $0 is always zero
  - not $t0, St1 can be done as
    - nor $t0, $t1, $0