# LOGICAL OPERATIONS

## • OR GATE

| A | B | y |
|---|---|---|
| 0 | 0 | 0 |
| 1 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 1 | 1 |



Binary levels from voltage

$1 \longrightarrow 4-5\,V$ (say)

$0 \longrightarrow 0-1\,V$
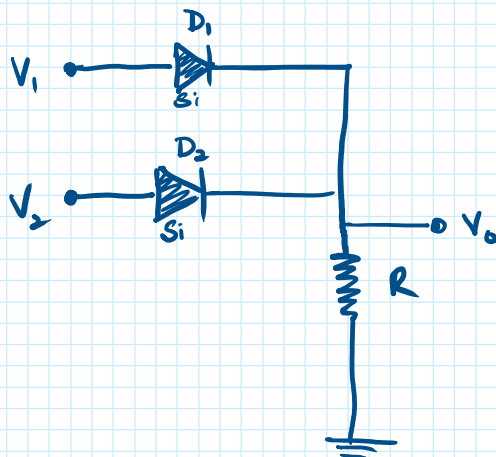
| $V_1$ | $V_2$ | $V_0$ |
|---|---|---|
| 0V [0] | 0V [0] | 0V [0] |
| 0V [0] | 5V [1] | 4.3V [1] |
| 5V [1] | 0V [0] | 4.3V [1] |
| 5V [1] | 5V [1] | 4.3V [2] |

▨ equivalent logic levels

## • AND GATE
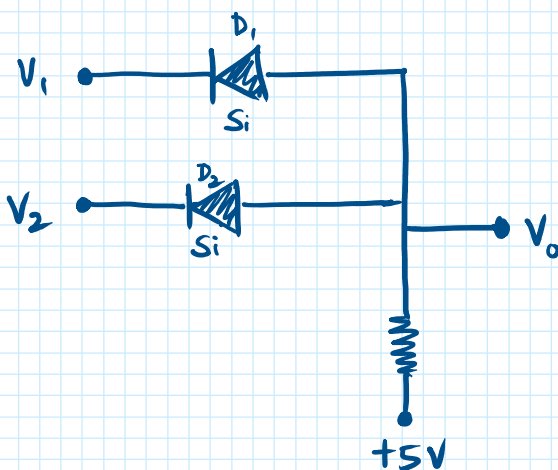
| A | B | y |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |



| $V_1$ | $V_2$ | $V_0$ |
|---|---|---|
| 0V [0] | 0V [0] | 0.7V [0] |
| 0V [0] | 5V [1] | 0.7V [0] |
| 5V [1] | 0V [0] | 0.7V [0] |
| 5V [1] | 5V [1] | 5V [1] |

# TRANSISTORS

EDA tools :
  to check analysis
  of circuits

LTspice