



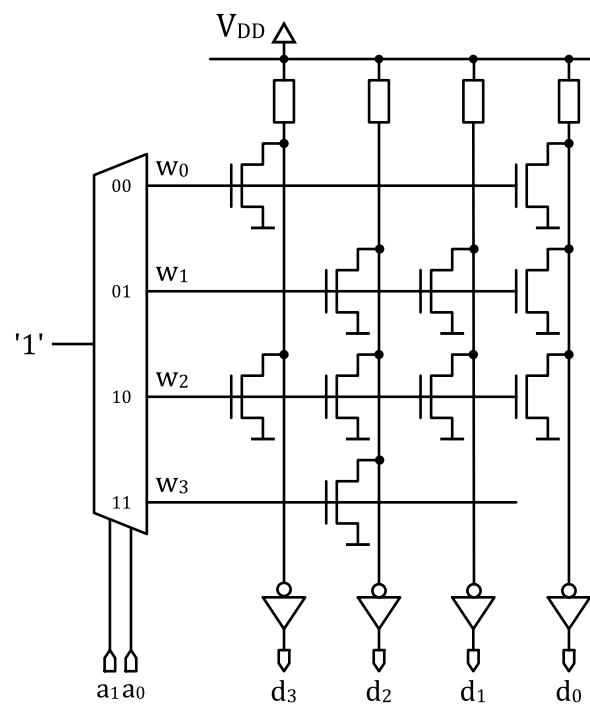
# Read-only Memory

## Exercises Digital Design

### 1 | ROM - Universal logic function

#### 1.1 Memory sizes

- What is the capacity of the memory in the figure below?
- What is the capacity of a memory with 10 input and 8 output lines?
- What is the capacity of a memory with 16 input and 8 output lines?



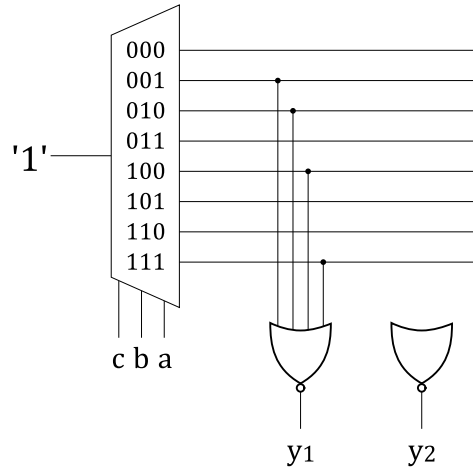
rom/logic-function-01



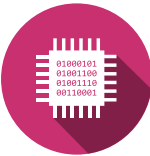
## 1.2 Realization of a function with multiplexers

Determine the equation of the  $y_1$  function performed by the demultiplexer and the NOR gate in the adjacent figure.

Create a multiplexer from 2 to 1 with the additional NOR gate: if  $c = 0$ ,  $y_2 = \bar{a}$  and if  $c = 1$ ,  $y_2 = \bar{b}$ .



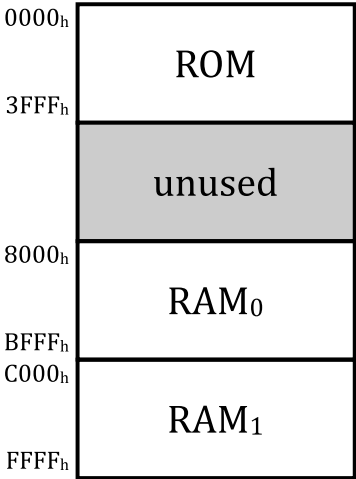
*rom/logic-function-02*



## 2 | ROM - Memory circuit assembly

### 2.1 Memory allocation table

Draw decoding and wiring of the memories of the following memory allocation.



*rom/rom-circuits-01*



### 3 | ROM - Types of read-only memory

#### 3.1 Intel HEX File CRC calculations

Calculate the CRC (Cyclic Redundancy Check) values of the following memory descriptors

- a) :0300300002337A??
- b) :020000020000??
- c) :10000000000D1925313C47515B636A71767A7E7F??
- d) :100010007F7F7E7A76716A635B51473C3125190D??
- e) :1000200000F3E7DBCFC4B9AFA59D968F8A868281??
- f) :10003000808182868A8F969DA5AFB9C4CFDBE7F3??
- g) :00000001??

*rom/crc-01*



## 4 | ROM - Typical circuits

### 4.1 ROM-Type

A ROM (Read-Only Memory) is offered with a serial (I2C) and parallel interface. The memory comprises 8 address bits and 8 data bits and is clocked at 66MHz. Calculate the theoretical maximum write rate. Also calculate how much % faster the faster one is.

*rom/rom-types-01*