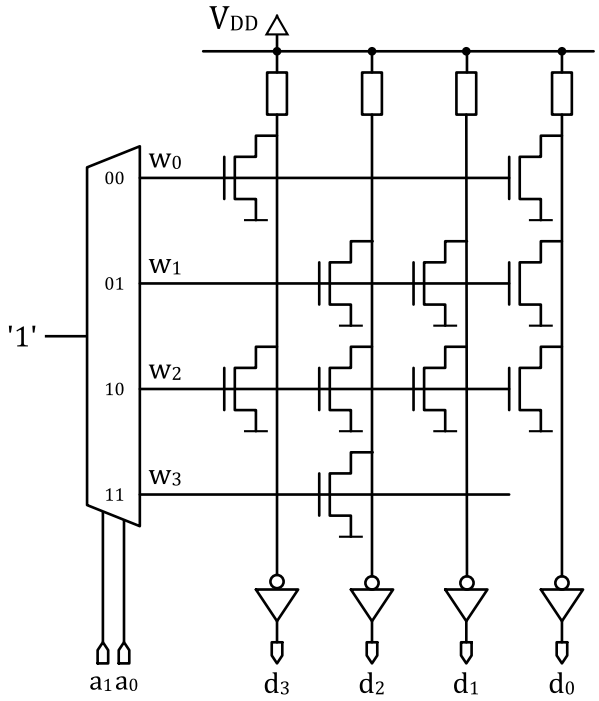
Read-only Memory

Exercises Digital Design

1 | ROM - Universal logic function

1.1 Memory sizes

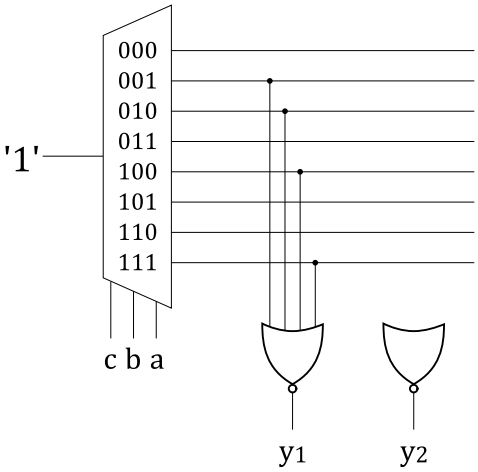
a) What is the capacity of the memory in the figure below?
b) What is the capacity of a memory with 10 input and 8 output lines?
c) What is the capacity of a memory with 16 input and 8 output lines?



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 $c = 0$, $y_2 = \overline{a}$ and if $c = 1$, $y_2 = \overline{b}$.

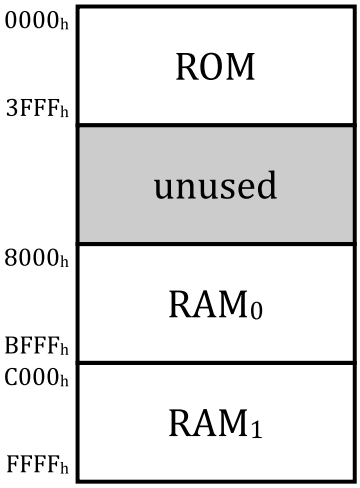


rom/logic-function-02

2 | ROM - Memory circuit assembly

2.1 Memory allocation table

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



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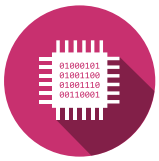


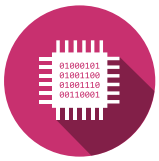
3 | ROM - Types of read-only memory

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