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ECE 5484, Homework 3

1. How many bits are required to address a 4M × 16 main memory if

a. Main memory is byte-addressable?

4 x 220 x 2 = 22 x 2 20 x 21 = 223 bytes

Therefore, 23 bits are needed for an address.

b. Main memory is word-addressable? (For part b, assume a 16-bit word.)

4 x 220 = 22 x 220 = 222 words

Therefore, 22 bits are needed for an address.

2. You want to use 256 x 8 RAM chips to provide a memory capacity of 4096 bytes.

a. How many chips will you need?

Number of bytes: 256 \* 1 = 256 bytes

Number of chips= 4096 / 256 = 16 chips

b. How many bits will each address contain?

Since 4096 = 212

Therefore, each address contains 12 bits

c. How many address lines must go to each chip?

Since number of bytes = 256 = 28

Number of address lines = 8 address lines

d. How many address lines must be decoded for the chip select inputs? In other words, specify the size of the decoder.

Since we have 16 chips = 24, so we need 4 address lines to select the chip.

3.