

# CS4410 Homework 1

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==== Questions ====

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*Due Saturday, January 28th, 11:59pm*

Question	#Points	Percentage
1. Tell Us About Yourself	6	11.1%
2. Practice Your Arithmetic	32	59.3%
3. Multiple Choice	16	29.6%
Total	54	100.0%

## Question 1: Tell Us About Yourself (6 points)

- (1.1) What is your NetID?
- (1.2) What are your preferred pronouns?
- (1.3) Tell us a bit more about yourself in a few lines?

12/11/21

## Question 2: Practice Your Arithmetic (32 points)

Answer the following questions. Try to do them without a calculator—you won't have access to one at an exam.

### Question 2.1: first exercise (16 points)

- (2.1.1) What is  $2^5 \times 2^1$ ? Only provide the exponent.
- (2.1.2) What is the binary number 01010100000010 in hexadecimal?
- (2.1.3) What is  $2^{14}$  in hexadecimal?
- (2.1.4) What is  $2^{34} - 1$  in hexadecimal?
- (2.1.5) If a computer has 45 address lines, what is the maximal byte address in hexadecimal?
- (2.1.6) If the stack pointer is 0xFFF5BF78 and the computer pushes 2 4-byte words onto the stack (which is growing down), what is the resulting stack pointer in hexadecimal?
- (2.1.7) How many 2048-byte blocks are there on a 2TB disk in  $2^x$  notation? (Provide only the exponent.)
- (2.1.8) What is 11000101 XOR 10000101 in binary?

### Question 2.2: another exercise (16 points)

- (2.2.1) What is  $2^4 \times 2^2$ ? Only provide the exponent.
- (2.2.2) What is the binary number 11101000001101 in hexadecimal?
- (2.2.3) What is  $2^{30}$  in hexadecimal?
- (2.2.4) What is  $2^{28} - 1$  in hexadecimal?
- (2.2.5) If a computer has 34 address lines, what is the maximal byte address in hexadecimal?
- (2.2.6) If the stack pointer is 0xFFF66FF0 and the computer pushes 3 4-byte words onto the stack (which is growing down), what is the resulting stack pointer in hexadecimal?
- (2.2.7) How many 2048-byte blocks are there on a 16TB disk in  $2^x$  notation? (Provide only the exponent.)
- (2.2.8) What is 01111101 XOR 00101111 in binary?

### Question 3: Multiple Choice (16 points)

Review the material in <https://www.cs.cornell.edu/courses/cs4410/2022sp/resources/background.pdf>. Then answer the following questions. For each question, check *one* of the boxes. These are randomized—do not be concerned if you see unlikely patterns.

**(3.1) Which of the following statements is *correct*?**

“Direct Memory Access” (DMA) means that devices can directly access the RAM of a computer.

Using a computer’s LOAD and STORE machine instructions, it is possible to directly read and write words on a disk in much the same way as words in RAM.

A disk controller is a program that controls access to a disk.

**(3.2) Which of the following statements is *wrong*?**

There are 8 bits in a byte.

In 2’s complement encoding of an 8-bit integer,  $-127$  is the minimum value.

ASCII encoding uses 7 bits.

**(3.3) Which of the following statements is *wrong*?**

Each register of a CPU has its own memory address.

An interrupt causes the program counter to change.

The “stack” of a computer is important for keeping track of the control flow of a computer program.

**(3.4) Which of the following statements is *correct*?**

On an x86 processor, when you push a value onto the stack, the stack pointer is decremented.

For efficiency, different cores of the same CPU can share the same registers and their stack.

Divide-by-zero is an example of an asynchronous, maskable signal.