

# CS4410 Homework 1

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==== Questions ====

**Generated for *su26***

***Due : See Gradescope***

<b>Question</b>	<b>#Points</b>	<b>Percentage</b>
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) If you would like to share, what are your preferred pronouns?
- (1.3) Tell us a bit more about yourself in a few lines?

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

Answer the following questions. This homework will not count for much, so answer the questions by yourself for practice. Try to do them without a calculator or AI—you won't have access to those at an exam (but you can check your answers that way).

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

- (2.1.1) What is  $2^0 \times 2^3$ ? Only provide the exponent.
- (2.1.2) What is the binary number 00011001000011 in hexadecimal?
- (2.1.3) What is  $2^{26}$  in hexadecimal?
- (2.1.4) What is  $2^{30} - 1$  in hexadecimal?
- (2.1.5) If a computer has 39 address lines, what is the maximal byte address in hexadecimal?
- (2.1.6) If the stack pointer is 0xFFFF59200 and the computer pushes 4 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 1TB disk in  $2^x$  notation? (Provide only the exponent.)
- (2.1.8) What is 10001001 XOR 11010010 in binary?

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

- (2.2.1) What is  $2^6 \times 2^4$ ? Only provide the exponent.
- (2.2.2) What is the binary number 11100011101000 in hexadecimal?
- (2.2.3) What is  $2^{25}$  in hexadecimal?
- (2.2.4) What is  $2^{20} - 1$  in hexadecimal?
- (2.2.5) If a computer has 38 address lines, what is the maximal byte address in hexadecimal?
- (2.2.6) If the stack pointer is 0xFFFFB5C90 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 1024-byte blocks are there on a 16TB disk in  $2^x$  notation? (Provide only the exponent.)
- (2.2.8) What is 11111010 XOR 01101101 in binary?

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

Review the material in <https://www.cs.cornell.edu/courses/cs4410/2026sp/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*?**

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

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 access each other's registers.

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

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.

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

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

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

Each register of a CPU has its own memory address.

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

The "heap" of a computer is where data objects are allocated dynamically.

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

In 2's complement encoding of an 8-bit integer,  $-128$  is the minimum value.

ASCII encoding uses 16 bits per character.

There are 4 bits in a hexadecimal digit.