CS4410 Homework 1

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=== *Questions* ===

Generated for *all*

Due Sunday, January 30th, 11:59pm ET

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?

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 $2^3 \times 2^2$? Only provide the exponent.

(2.1.2) What is the binary number 00000000100101 in hexadecimal?

(2.1.3) What is 2^{23} in hexadecimal?

(2.1.4) What is $2^{12} - 1$ 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 0xFFF3DAA8 and the computer pushes 3 4-byte words onto the stack (which is growing down), what is the resulting stack pointer in hexadecimal?

(2.1.7) How many 4096-byte blocks are there on a 16TB disk in 2^x notation? (Provide only the exponent.)

(2.1.8) What is 10000111 XOR 01010101 in binary?

Question 2.2: another exercise (16 points)

(2.2.1) What is $2^8 \times 2^4$? Only provide the exponent.

(2.2.2) What is the binary number 01001100000001 in hexadecimal?

(2.2.3) What is 2^{19} in hexadecimal?

(2.2.4) What is $2^{25} - 1$ in hexadecimal?

(2.2.5) If a computer has 30 address lines, what is the maximal byte address in hexadecimal?

(2.2.6) If the stack pointer is 0xFFF22378 and the computer pushes 4 4-byte words onto the stack (which is growing down), what is the resulting stack pointer in hexadecimal?

(2.2.7) How many 4096-byte blocks are there on a 32TB disk in 2^x notation? (Provide only the exponent.)

(2.2.8) What is 01100110 XOR 00111011 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.

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

A device interrupt is when the CPU signals to the device that it wants to perform an operation.

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

An ASCII character consists of 8 bits.

There are 8 bits in a byte.

In 2's complement integer encoding, the most significant bit represents the sign of the number.

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

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

Each register of a computer has its own memory address.

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

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

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.

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