← Lab 5: Practice, practice, practice

Finish by midnight on Sunday, 10/14

The exam is on **Tuesday, 10/16,** so you need some practice.

> You will write your answers in a PLAIN TEXT file (.txt). Please do not submit a Word document, or PDF, or anything like that. Just a text file.

Numeric Representation

Try to do these without a calculator first. But you can use a calculator to check. Then, if you don't get the right answer, try to figure out what you did wrong, or ask for help.

1. Write the ranges of **unsigned binary numbers** with the following numbers of bits:
   - 4 bits
   - 8 bits
   - 11 bits
2. Write the ranges of **signed two's complement binary numbers** with the following numbers of bits:
   - 4 bits
   - 8 bits
   - 11 bits
3. Convert these **decimal numbers** to binary.
   - 13
   - 58
   - 141
4. Convert these **unsigned binary numbers** to decimal.
   - `01001001`
   - `00011001`
   - `10000000`
5. Convert these **signed two's complement binary numbers** to decimal.

    - `01001001`
    - `11111001`
    - `10000000`
6. Write the **binary representation** of these **signed two's complement binary numbers**, but extended to **16 bits.**
    - `01001001`
    - `11111001`
    - `10000000`
7. Compute the following **bitwise operations.**
    - `~00111001`
    - `11100110 & 01110001`
    - `11100110 | 01110001`
8. I have a register which contains the value `0xE315DEAD`. I use `sw` to store it to memory. Write the **sequence of bytes** that would be placed in memory if our computer is using:
    - Little-endian integers
    - Big-endian integers
9. I have an array where **each item is 16 bytes long.** If I want to access the 7th item (that is, `array[6]`), how many bytes do I have to move forward from the beginning of the array?
10. Let's say `t3` contains `44` and `a1` contains `1054`. For the instruction `sb t3, (a1)`, explain **what data is copied into what location.**
11. In MIPS, when you load a **byte from memory** into a register:
    - What happens to its value? (There are two options.)
    - Why do we do this?
12. Encode the following integers as single-precision IEEE 754 floats, and **write your answer as an 8-digit hexadecimal number.** Do not treat them as 2's complement, just use the sign given.
    - `+1000111010`
    - `-1000111010`
    - `+1`

Submitting

Make sure your file is named `username_lab5.txt`, like `jfb42_lab5.txt`.

Submit here.

Drag your asm file into your browser to upload. **If you can see your file, you uploaded it correctly!**

You can also re-upload if you made a mistake and need to fix it.