CS2100 Homework Due Wednesday prior to class Name: Kurt Jensen

1, 2, 4 (3 is shown as a reference), 7 and 8. Submit as one PDF

*1. **(a)** How many bytes are in the main memory of the Pep/9 computer? **(b)** How many words are in it? **(c)** How many bits are in it? **(d)** How many total bits are in the Pep/9 CPU? **(e)** How many times bigger in terms of bits is the main memory than the CPU?

2. **(a)** Suppose the main memory of the Pep/9 were completely filled with unary instructions. How many instructions would it contain? **(b)** What is the maximum number of instructions that would fit in the main memory if none of the instructions is unary? **(c)** Suppose the main memory is completely filled with an equal number of unary and nonunary instructions. How many total instructions would it contain?

*3. Answer the following questions for the machine language instructions 6AF82C and D623D0. **(a)** What is the opcode in binary? **(b)** What does the instruction do? **(c)** What is the register-r field in binary? **(d)** Which register does it specify? **(e)** What is the addressing-aaa field in binary? **(f)** Which addressing mode does it specify? **(g)** What is the operand specifier in hexadecimal?

4. Answer the questions in Exercise 3 for the machine language instructions 7B00AC and F70BD3.

7. Determine the output of the following Pep/9 machine language program. The left column is the memory address of the first byte on the line:

```
0000 D10013
0003 F1FC16
0006 D10014
0009 F1FC16
000C D10015
000F F1FC16
0012 00
0013 4A6F
0015 79
```

8. Determine the output of the following Pep/9 machine language program if the input is tab. The left column is the memory address of the first byte on the line:

```
0000 D1FC15
0003 F1001F
0006 D1FC15
0009 F10020
000C D1FC15
000F F10021
0012 D10020
0015 F1FC16
0018 D1001F
001B F1FC16
001E 00
```

1.
    a. 65536 bytes
    b. 32768 words
    c. 524288
    d. 92 bits
    e. 5698.78261 times bigger
2.
    a. 65536
    b. 21845.3333
    c. 32768 instructions
4.
    1. 7B00AC
        a. 0111
        b. Subtracts from r
        c. 1
        d. Index register, X
        e. 011
        f. Stack-relative
        g. 00AC
    2. F70BD3
        a. 1111
        b. Store byte r to memory
        c. 0
        d. Accumulator, A
        e. 111
        f. Stack-deferred indexed
        g. 0BD3
7.
    a. Joy
8.
    a. at