

Concordia University
Dept. of Computer Science and Software Engineering
COMP 228 - System Hardware
Winter 2015

Practice Problems 2

Question 1.

Given a binary pattern in some memory location, it is possible to tell whether this pattern represents a machine instruction or a number?

Question 2.

Write an assembly language program that can evaluate the expression:

$(A \times B) + (C \times D)$ (A, B, C, D refer to main memory addresses)

in a single accumulator processor. Assume the processor is a single address machine and has LOAD, STORE, MULTIPLY, and ADD instructions. For example, the following are typical forms of the use of these instructions:

```
LOAD some_address
MULTIPLY some_other_address
STORE yet_another_address
LOAD another_address
MULTIPLY address_x
ADD some_address
STORE address_xyz
```

Question 3.

Registers R1 and R2 of a computer contain the decimal values 1200 and 4600. What is the effective address of the memory operand in each of the following instructions?

- (i) MOVE 20(R1), R5
- (ii) LOAD #3000, R5
- (iii) STORE R5, 30(R1,R2)
- (iv) ADD -(R2), R5
- (v) SUBTRACT (R1)+, R5

Note: the convention for the above instructions is: opcode source1 , source2/destination

Question 4:

Register R5 in a program is used to point to the top of the stack. Write

a sequence of instructions using indexed, autoincrement, and autodecrement addressing modes to perform each of the following tasks (DO NOT USE PUSH OR POP INSTRUCTIONS) :

- (a) Pop the top two items from the stack, add them, and then push the result onto the stack.
- (b) Copy the fifth item from the top of the stack into register R3.