Lab 07: LC-3 Control Instructions & Addressing Modes (Due in class, Wed Oct 14)

A. Why?

Programming the LC-3 requires thorough knowledge of its control instructions and addressing modes.

B. Outcomes

By the end of the activity you should

- Be familiar with the data calculation/movement and control instructions of the LC-3.
- Know what addressing mode to use in different situations.

C. Questions

First, finish the Activity LC-3 Control Instructions from class 13. Also answer the following questions:

1. (Modified Problem 5.16) Which LC-3 addressing mode makes the most sense to use under the following conditions? (There may be more than one correct answer; justify your answer with some explanation.)
   (a) You want to load 1 value from an address $< \pm 2^8$ locations away.
   (b) You want to load 1 value from an address $> 2^8$ locations away.
   (c) You want to load 1 value from an address pointed to by M[PC+10].
2. (Modified Problem 5.32) If the condition codes have values N = Z = 0, P = 1 at the beginning of the following sequence of LC-3 instructions, what are the condition codes at the end of the sequence?
   `x3050..x3054` contain (hex) `x0202, x5020, x0E02, x5020, x103F`
3. The picture to the right shows part of the LC-3 implementation: 16 bits are being transported (using a "global bus") to a register. (a) When is the output = 1, and what part of the LC-3 does this implement? (b) Suppose we negate the output of the OR gate. Now when is the output = 1 and what part of the LC-3 does this implement?