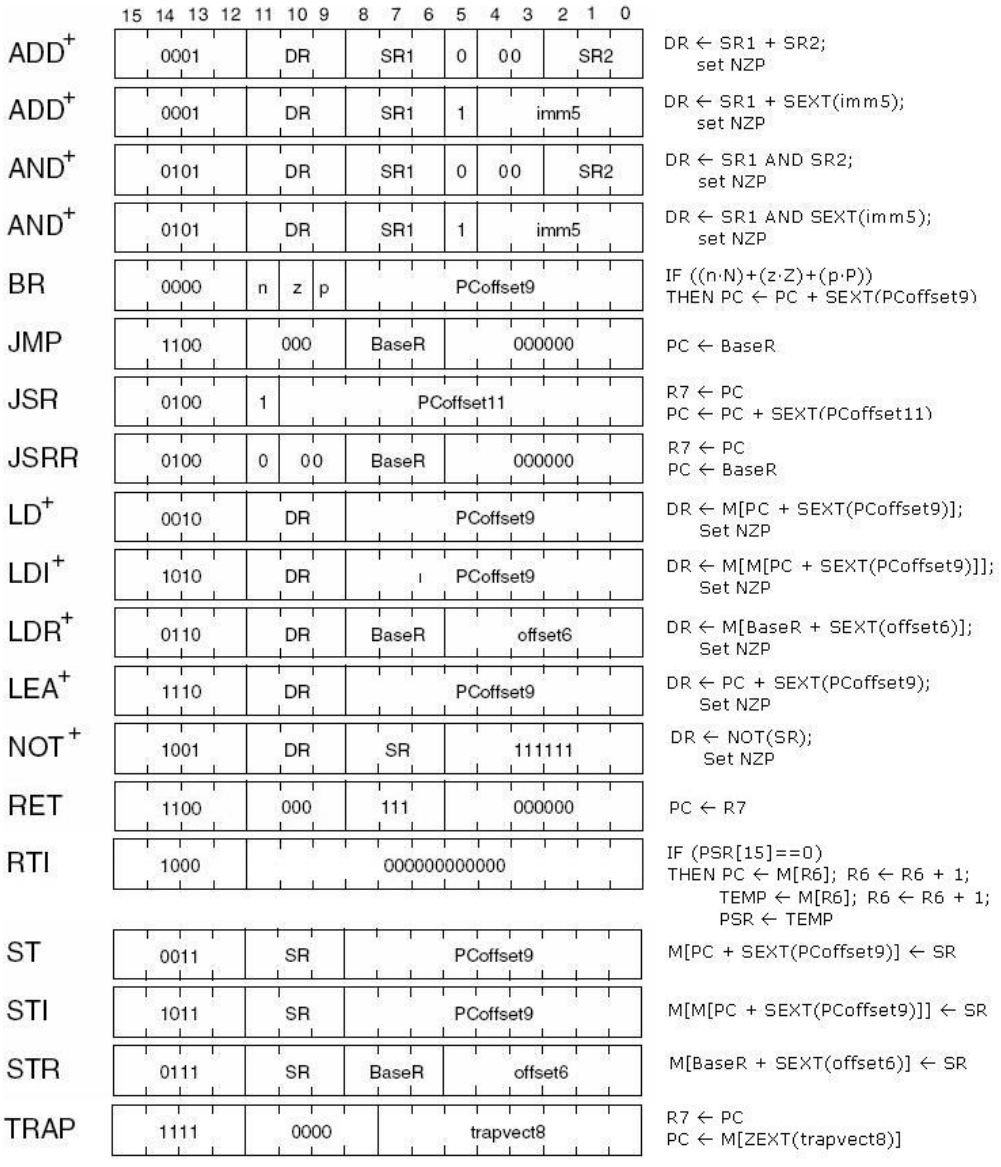
HCMUT ECE 120 Discussion Section 9:
LC-3 Instructions

In this discussion, you will be given a sequence of binary words that correspond to LC-3 instructions and you will be asked to convert each binary word to a corresponding LC-3 instruction. You will then explain the function performed by the sequence of the given instructions.

You should read Chapter 4 and §5.1-5.2 from Patt & Patel before attending this discussion.

LC-3 Instruction Set



1. LC-3 Instructions

Shown below is a snapshot of a portion of the contents of the LC-3 memory for addresses x3000-x3004. These addresses contain a short program. The 16-bit addresses of, and data in, the RAM are encoded in hexadecimal representation. In this discussion, you will interpret the contents of the RAM, trace the program, and determine its functionality.

address	data
x3000	x927F
x3001	x5842
x3002	x96FF
x3003	x5903
x3004	x993F

1) Translate the contents of the RAM into its LC-3 instructions and write them in RTL notation. A copy of the encoding for the LC-3 instruction set appears on page 1. The first one has been done for you as an example.

Address	Binary Instruction (translate from hex above)	LC-3 Instruction	RTL (be specific to this instruction)
x3000	1001 0010 0111 1111	NOT R1, R1	R1 ← NOT R1
x3001			
x3002			
x3003			
x3004			

2) Examine the sequence of your instructions. What function does the program perform? Your description should explain the high level behavior of the program in a single sentence and should not be a step-by-step description of what the program did. For example, “First the program adds R1 to R2 and stores it into R3…” is unacceptable.