LC-3 Assembly Language

Please do problems 6.4, 6.8, 6.11, 6.16, 7.6, 7.8, 7.16, and 7.18 from the textbook.

Here is an additional problem for this week:

1. Subroutines in LC-3 Assembly

Modify the program "sumabs.asm" from lecture (and posted on the course website along with this assignment) by creating a subroutine beginning with the label "absr1", where this subroutine replaces the integer contents of Register 1 (R1) with its absolute value. Place this subroutine in memory after the TRAP function and before the data. Then, using the LC-3 commands JSR and RET appropriately, replace the corresponding inline absolute-value code in the loop to use this subroutine instead. (Note that the use of subroutines is helpful when the same operation must be performed several times in different parts of the program; using a subroutine, the code for that operation need only be written, debugged, and stored in memory once and can be reused many times.)

Assemble and test your modified code to confirm that it works properly, and that you understand how it works. In particular, examine the contents of R7 after the jump to the subroutine and confirm that it contains the proper return address after subroutine completion. (Because the LC-3 ISA uses R7 for storing return addresses, programmers tend to avoid using R7 for other purposes unless absolutely necessary so as to minimize inadvertent programming errors of overwriting and thus losing the return address.)