CSCI 240 - Computer Organization and Assembly Language Programming
Homework 6 - Programming

Problem 1. Shown below are the contents of registers before and after the LC-3 instruction at location `x3210` is executed. Identify the instruction stored in `x3210`. **Note:** There is enough information to *uniquely* specify the instruction at `x3120`.

	Before	After
R0:	`xFF1D`	`xFF1D`
R1:	`x301C`	`x301C`
R2:	`x2F11`	`x2F44`
R3:	`x5321`	`x5321`
R4:	`x331F`	`x331F`
R5:	`x1F22`	`x1F22`
R6:	`x01FF`	`x01FF`
R7:	`x341F`	`x3211`
PC:	`x3210`	`x3220`
N:	0	0
Z:	1	1
P:	0	0

Problem 2. The LC-3 has no Divide instruction. A programmer needing to divide two numbers would have to write a routine to handle it. Show the systematic decomposition of the process of dividing two positive integers. Write an LC-3 machine language program starting at location`x3000` which divides the number in memory location `x4000` by the number in memory location `x4001` and stores the quotient at `x5000` and the remainder at `x5001`. **Hint:** For some integers a and b, the *division algorithm* states there exists q and r such at that $a = bq + r$ for some $q \geq 0$ and $0 \leq r < b$. Finding q and r is the objective of this problem.

Problem 3. Write a short LC-3 program that compares the two numbers in R1 and R2 and puts the value 0 in R0 if R1 = R2, 1 if R1 > R2 and -1 if R1 < R2.