# CPS310 Lab 1 – ARC I

## Preamble

This first lab is very straightforward. It is intended to introduce you to the ARCTools environment and get you started writing assembly.

## Lab Description

First thing's first, you can download ARCTools from D2L under Content->ARCTools. You can also get it from the source at the following link:

**http://iiusatech.com/murdocca/CAO/**

There's nothing to install, just download the simulator and execute the JAR file. If you have Java installed, you should be able to simply double-click **ARCToolsv2.1.2.jar**.

**0)** Start by duplicating the simple program we saw in class this week:

```
.begin
.org 2048

prog1:  ld     [x], %r1
        ld     [y], %r2
        addcc  %r1, %r2, %r3
        st     %r3, [z]

x:      15
y:      9
z:      0

.end
```

Save this file as Lab1.asm. Assemble, and load it into the simulator. Step through the program one instruction at a time as we saw in class, and make sure everything is working as expected.

**1)** Modify Lab1.asm by removing labels **y** and **z**. Do not remove the values 9 and 0! The new snippet of code should look like this:

```
x:      15
        9
        0
```

Adjust your program to perform the same addition operation as before, but now you can no longer use labels **y** and **z** to access locations in memory.

**2)** Next, add the following line to your Lab1.asm:

```
.org    2068
x:      15
        9
        0
```

Does your solution from **1)** still work? If so, good. If not, you'll have to figure out a solution that doesn't involve hard-coding memory locations.

**3)** Further modify Lab1.asm as follows:

```
.org    2200
x:      -1
        2
        -3
        4
        -5
```

Change the behavior of your program so that instead of adding two numbers, it will add all five numbers shown above.

I. The result of this addition should be stored at memory location **2240**

II. When performing this addition, use no more than two registers (%r1, %r2).

## Submission

Labs are to be submitted ***individually***! Submit your Lab1.asm file (from question 3) on D2L under Lab #1.