EEC 170 – Computer Architecture
Spring 2025

Laboratory Exercise 3: Computer Arithmetic

Due Date: October 29
Full Points - 100

Objectives
Division and multiplication are expensive operations in hardware. Low-cost processors may choose to implement these operations in software. Writing these programs in assembly language makes sense because they must be efficient. In this exercise you will write an efficient RISC-V assembly program to implement integer division.

What you need to do?
Write a procedure myDiv that computes the **quotient** and remainder obtained by dividing X by Y. A skeleton file is given which does everything for you except the **myDiv** routine. Your task is to write that function. Make sure you test your program rigorously by trying different values for X and Y.

Assumptions
- X and Y are **12-bit unsigned integers**. Y cannot be zero.
- Assume, X and Y are passed in registers a1 and a2. Use register s1 and s2 to return the results, quotient in s2 and remainder in s3.
- Figure 3.9 and figure 3.10 describe the algorithm.
- *You cannot use div, mul, rem instructions. You will get ZERO credit if these instructions are used anywhere in your program.*

A fraction of the grade for this program will depend on making the myDiv function as **efficient** as possible.

See discussion on Page 206 to make the algorithm a bit more efficient. But first get the program to work correctly before spending time on optimizing your code.

What do you need to submit?
1. Your code
2. Screen shots showing that the results for the following inputs
   a. X=1000 and Y=14
   b. X= 2047 and Y = 74
   c. X = 34   and Y = 4095
   d. X = 189 and Y = 189