# UNB
# Faculty of Computer Science
# **Assignment 4** CS2253 Fall 2021

**Due Date: October 28, 2021 - 8:30 am**

**Purpose**: write multiple subroutines to complete a larger assembly language program

## Simplifying Fractions

**Background:** Fractions are simplified by dividing the numerator and denominator by their greatest common denominator (GCD). In this assignment you will write two subroutines, which are used by the main program (provided in D2L) to simplify a fraction stored at the end of the program. The first subroutine divides two integers using repeated subtractions, something you did for assignment 4 and will write now as an assembly language subroutine. The second subroutine implement's Euclid's GCD algorithm, and makes use of your divide subroutine.

Here is pseudocode for Euclid's algorithm given the numerator `x` and the denominator `y`:

```
while y > 0
    r = remainder of x/y
    x = y
    y = r
end
# remainder is in x
```

**Your job:** Write two subroutines to complete the program given in `fraction.asm`:

1. `DIVIDE`: Divide R0 by R1, putting quotient in R2 and remainder in R3
2. `GCD`: Euclid's algorithm for GCD of R0 and R1, with result put in R2

**Make sure you don't use labels that are already in use in `fraction.asm`!**

**Program behaviour:** The `fraction.asm` program reads the numerator and denominator (both assumed to be greater than 0) stored in the program, and replaces them with the numerator and denominator of the simplified fraction.

- **Write your program:** Complete the program by adding the above two subroutines to `fraction.asm`
- **Test your program:** Load your program in the LC-3 simulator and test it thoroughly by running it with multiple different input values.
- **Submit your program:** Create a single `.zip` file containing the completed `fraction.asm` file and a pdf file with a listing of your program (don't give a snapshop of LC3Tools because comments don't show) **and a sample run in the console.**