Computational Number Theory
Programming HW 1

Due Date: 19/08/2022

1. Write a program that accepts two integers a, b and

   (a) finds $gcd(a, b)$;

   (b) finds two integers x, y such that $ax + by = gcd(a, b)$;

   (c) accepts a third integer c and finds x, y such that $ax+by = c$ (or reports that a solution does not exist).

   Your program should work for integers up to at least 512 bits ($\sim$155 digits). You may use any programming language including libraries as needed for multiprecision; for example, for C/C++, the gmp library (gmplib.org), provides a customized type for large integers with supported functions.

   One way to generate large test cases is to set $a = r^m - 1, b = r^n - 1$ (see HW 1).