HOMEWORK 1
CS 417

Problem 1. Let $a, b, d \in \mathbb{Z}$. Suppose that $d \mid a$ and $d \mid b$.

(1) Show that $d \mid a - b$.
(2) Let $m, n \in \mathbb{Z}$. Show that $d \mid ma + nb$.

Problem 2. Let $a_1, a_2, \ldots, a_n$ be integers. The greatest common divisor of $a_1, a_2, \ldots, a_n$, denoted by $\gcd(a_1, a_2, \ldots, a_n)$, is the largest positive integer d such that $d \mid a_i$ for each $1 \leq i \leq n$. It is known that

$$\gcd(a_1, a_2, \ldots, a_n) = \gcd(a_n, \gcd(a_1, \ldots, a_{n-1})).$$

Given a list of integers, say `alist`.

(1) Write a recursive function named recursive_gcd(alist) that takes alist as an input and return the greatest common divisor of all elements in alist.
(2) Write a non-recursive function, named non_recursive_gcd(alist) to achieve the same goal.

For this problem, you can use any functions that we wrote to compute $\gcd(a, b)$ for two given integers (this is the base case).