

Divisibility, primality and modular arithmetics (preparation)

The purpose of this handout is to prepare you for next week's session and to familiarize you with the notions of divisibility and prime numbers. Please take some time in the week to read it and have a try at the questions. It is okay not to find all the answers, we will go through this during the session.

Let a be a nonnegative integer and b be a positive integer. We say that b divides a if there exists some nonnegative integer k such that $a = kb$. The integer b is called a divisor of a .

An integer $p \geq 2$ is called a prime number if its only divisors are 1 and p itself. We require in the previous definition that p be at least equal to 2, thus 1 is not a prime number. An integer $n \geq 2$ that is not prime is called composite.

Question 1 *Among the numbers from 1 to 10, which ones are prime, which ones are composite?*

Question 2 *8, 9, 10 form a sequence of 3 consecutive composite numbers. Can you find 2012 consecutive composite numbers?*

Question 3 *How many divisors of 360 are there?*

Question 4 *What is the sum of all the divisors of 360? Can you find this value without having to write explicitly what these divisors are?*

Question 5 *Recall that $n! = 1 * 2 * 3 * \dots * (n - 1) * n$. Suppose that someone would write down for you the value of $100!$; it would end with many 0s. How many of them exactly?*