

Do what you did not do last Monday! And continue with these.

**1.**

- (i) Show that any 6-digit number we obtain by repeating the digits of a 3-digit number is divisible by 91. For example by repeating 123 we get  $123123 = 1353 \cdot 91$ .
- (ii) Prove that if 23 divides  $5a + 9b$  for some integers  $a, b$ , then 23 also divides  $3a + 10b$ !
- (iii) Show that for all  $n \in \mathbb{N}$  we have  $133 \mid 11^{n+1} + 12^{2n-1}$ !

**2.** What is the greatest common divisor and least common multiple of the following integers?

- (i)  $2^{23}3^{10}7^{13}$  and  $2^{15}7^{10}13^5$ ;
- (ii)  $2^{23}3^{10}7^{13}$ ,  $2^{15}7^{10}13^5$  and  $3^{15}7^{20}11^2$  (here first define the gcd and lcm of 3 integers!)