

Exercise sheet 4

1. Solve the following congruences.

a) $13x \equiv 7 \pmod{8}$

b) $12x \equiv 26 \pmod{18}$

c) $152x \equiv 6 \pmod{414}$

2. Use the divisibility criterion from the lecture to decide whether the following number is divisible by 11.

$$n = 456\,494\,187\,952\,869\,353\,305\,062$$

3. Use the divisibility criteria from the lecture to decide whether the following number

$$n = 8\,333\,333\,333\,333\,333\,333\,333$$

is divisible by

a) 3,

b) 11,

c) 13.

4. Derive the divisibility criterion for 7 (in base 10).

5. Find the remainder when you divide

$$13^{742} - 10 \cdot 14^{521} + 22^{102}$$

by 7.

6. Find the remainder when you divide

$$4^{254} + 2 \cdot 7^{123} - 3 \cdot 11^{102}$$

by 5