Exercise sheet 4

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

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

2. 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.

3. Find the remainder when you divide

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

by 7.

4. Find the remainder when you divide

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

by 5

5. Solve the following congruences.

a) $13x \equiv 7 \pmod 8$ b) $12x \equiv 26 \pmod{18}$ c) $152x \equiv 6 \pmod{414}$

6. Express the number 231 in base

a) 2 b) 3 c) 5 d) 16