Exercise sheet 5

First, some exercises we were not able to finish last time

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

2. Find the remainder when you divide

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

by 5

Now something new

3. Express the number 231 in base

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

4. Compute the prime decomposition of 68 310.

5. Prove that $n^2 \equiv 1 \pmod{24}$ for every $n \in \mathbb{N}$, $n \perp 24$.