ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE
School of Computer and Communication Sciences

Handout 17 Introduction to Communication Systems
Homework 9 November 19, 2009

PROBLEM 1.

- If $a \equiv a' \pmod{m}$, show that for any integer t, $a^t \equiv a'^t \pmod{m}$.
- Is the converse true? (i.e if $a^t \equiv a'^t \pmod{m}$ for some $t \geq 2$, can we always conclude that $a \equiv a' \pmod{m}$

PROBLEM 2. For which positive integer numbers a, is $a^3 + 3$ divisible by $a + 3$? (Hint: 3=27-24)

PROBLEM 3. Prove that if n is an odd integer number then:

- $n^2 - 1$ is divisible by 8
- $n^8 - 1$ is divisible by 32

PROBLEM 4. Find all the integer numbers n such that $7n + 5 \equiv 0$; (mod 2009).