

Präsenzübungen zu Vertiefung Elementare Zahlentheorie

WS 2010/2011, Blatt 8

Präsenzaufgabe 29. Determine all solutions of the following quadratic congruences:

(a) $2x^2 + 3x + 1 \equiv 0 \pmod{7}$;

(b) $3x^2 + x + 4 \equiv 0 \pmod{7}$.

Präsenzaufgabe 30. Let p be a prime $\neq 2$ and g a primitive root modulo p . Show: The powers g^2, g^4, \dots, g^{p-1} are mutually noncongruent quadratic residues, the powers g, g^3, \dots, g^{p-2} are mutually noncongruent quadratic non-residues modulo p .

Präsenzaufgabe 31. Determine the remainders when divided by 23 for

$$2^{11}, 3^{11}, 4^{11}, 5^{11}, 21^{11}, 22^{11}.$$

Präsenzaufgabe 32. Calculate the following Legendre symbols:

(a) $\left(\frac{3}{29}\right), \left(\frac{35}{281}\right), \left(\frac{65}{307}\right), \left(\frac{-198}{71}\right)$;

(b) $\left(\frac{3}{73}\right), \left(\frac{17}{73}\right), \left(\frac{19}{281}\right), \left(\frac{241}{599}\right)$.