

Exercises: in your proof, write down the full details.

- (1) Calculate the Legendre symbols $\left(\frac{44}{47}\right)$.
- (2) What is $\left(\frac{a^2}{p}\right)$ where p is a prime?
- (3) Calculate the Legendre symbol $\left(\frac{1000}{11}\right)$, $\left(\frac{85}{101}\right)$.
- (4) Show the order of a quadratic residue divides $\phi(n)/2$. (Thus a primitive root is a quadratic non-residue.) On the other hand, let a be a quadratic non-residue. Is a a primitive root?
- (5) Let p be a prime and r be a primitive root mod p . Find all elements of the form r^x which are quadratic residues (mod p).