MATH 406 – HOMEWORK IX

(due Friday 24 April 2009)

1. [4] Prove Euler's Criterion (Theorem 11.3) using indices and Theorem 11.2.

2. [4] Use Gauss' Lemma to evaluate $\left(\frac{5}{17}\right)$.

3. [6] Use the arithmetic properties of the Legendre symbol to evaluate the following:

(a) $\left(\frac{-8}{17}\right)$.

(b) $\left(\frac{77}{103}\right)$.

4. [6] Let p and q be odd primes and assume that $p \equiv q \pmod{20}$. Prove that $\left(\frac{5}{p}\right) = \left(\frac{5}{q}\right)$.

NOTE: Explain your work clearly. Your solutions must include enough detail to justify your conclusions.