

NUMBER THEORY HW 2: DUE THURSDAY, OCTOBER 11

Question 1. *Exhibit a complete residue system modulo 17 composed entirely of multiples of 3.*

Question 2. *Prove that 19 does not divide $4n^2 + 4$ for any integer n .*

Question 3. *Show that if p is prime, then $\binom{p-1}{k} \equiv (-1)^k \pmod{p}$ for $1 \leq k \leq p-1$. (This is problem 44 in Section 2.1, with a hint in the textbook).*

Question 4. *Let p be prime. Determine the value of $\binom{3p}{2p}$ modulo p and provide an explanation. Hint: It's not 0 in general.*