

MATH 117 FALL 2014 HOMEWORK 1

DUE THURSDAY SEPT. 11 3PM IN ASSIGNMENT BOX

QUESTION 1. (5 PTS) *Prove that 11 is prime but 57 is not.*

QUESTION 2. (5 PTS) *Let n be an arbitrary natural number. Prove that $4 \nmid (n^2 + 2)$. (Hint:¹)*

QUESTION 3. (5 PTS) *Given that there are infinitely many pairs of prime numbers with difference $< 7 \times 10^7$. Prove that there is a natural number $d < 7 \times 10^7$ such that there are infinitely many pairs of prime numbers with difference exactly d .*

QUESTION 4. (5 PTS) *Prove that there are infinitely many primes of the form $4n + 3$ (that is when divided by 4, the remainder is 3). (Hint:²)*

1. Discuss n even/odd.

2. Consider $4p_1 \cdots p_n - 1$.