

Problem Solving

Set 18

21 July 2012

1. Let n be a positive integer. Prove that 2^{n-1} divides

$$\sum_{0 \leq k < n/2} \binom{n}{2k+1} 5^k.$$

2. Find all ordered triples of primes (p, q, r) such that

$$p \mid q^r + 1, \quad q \mid r^p + 1, \quad r \mid p^q + 1.$$