October 13, 2019

1 Problem 1 Day 1 Spain, round 2, 1992

1. A natural number N is divisible by 83 and N^2 has exactly 63 divisors. Find the smallest N with these properties.

2 Problem 1 Day 2 Spain, round 2, 1992

Prove that the arithmetic progression 3,7,11,15,... contains infinitely many prime numbers.

3 Putnum 2000, B2

Prove that the expression

$$[\frac{\gcd(m,n)}{n}\binom{n}{m}]$$

is an integer for all pairs of integers $n \geq m \geq 1$.