New Zealand Mathematical Olympiad Committee

Sample Number Theory Problems

by Ross Atkins

1. How many positive integers are divisors of 6000.
2. Find all primes that can be written both as a sum and as a difference of two primes (note that 1 is not a prime).
3. Find all pairs of integers n and m, such that

$$\frac{1}{n} + \frac{1}{m} = \frac{1}{5}$$

4. Find all positive integers n such that $n! + 3$ is a perfect square.
($n!$ means $1 \times 2 \times 3 \times \cdots \times n$)