Serbia Team Selection Test 2006

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by Medjl

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$Problem1$

The set S = 1,2,3,...,2006 is partitioned into two disjoint subsets A and B such that:
(i) 13 A;
(ii) if a A, b B, a+b S, then a+b B;
(iii) if a A, b B, ab S, then ab A.
Determine the number of elements of A

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$problem2$

:A point P is taken in the interior of a right triangle ABC with $\angle C = 90$ such hat $AP = 4, BP = 2$, and $CP = 1$. Point Q symmetric to P with respect to AC lies on the circumcircle of triangle ABC. Find the angles of triangle ABC.

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3 Determine all natural numbers n and $k > 1$ such that k divides each of the numbers $\binom{n}{1}, \binom{n}{2}, \ldots\ldots\ldots, \binom{n}{n-1}$
