

**Croatia Team Selection Test 2001**

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by parmenides51

- 1 Consider  $A = \{1, 2, \dots, 16\}$ . A partition of  $A$  into nonempty sets  $A_1, A_2, \dots, A_n$  is said to be good if none of the  $A_i$  contains elements  $a, b, c$  (not necessarily distinct) such that  $a = b + c$ .
    - (a) Find a good partition  $\{A_1, A_2, A_3, A_4\}$  of  $A$ .
    - (b) Prove that no partition  $\{A_1, A_2, A_3\}$  of  $A$  is good

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  - 2 Circles  $k_1$  and  $k_2$  intersect at  $P$  and  $Q$ , and  $A$  and  $B$  are the tangency points of their common tangent that is closer to  $P$  (where  $A$  is on  $k_1$  and  $B$  on  $k_2$ ). The tangent to  $k_1$  at  $P$  intersects  $k_2$  again at  $C$ . The lines  $AP$  and  $BC$  meet at  $R$ . Show that the lines  $BP$  and  $BC$  are tangent to the circumcircle of triangle  $PQR$ .

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  - 3 Find all solutions of the equation  $(a^a)^5 = b^b$  in positive integers.
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