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by jasperE3

**Problem 1** Three squares  $BCDE$ ,  $CAFG$  and  $ABHI$  are constructed outside the triangle  $ABC$ . Let  $GCDQ$  and  $EBHP$  be parallelograms. Prove that  $APQ$  is an isosceles right triangle.

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**Problem 2** Periodic sequences  $(a_n)$ ,  $(b_n)$ ,  $(c_n)$  and  $(d_n)$  satisfy the following conditions:

$$a_{n+1} = a_n + b_n, \quad b_{n+1} = b_n + c_n,$$

$$c_{n+1} = c_n + d_n, \quad d_{n+1} = d_n + a_n,$$

for  $n = 1, 2, \dots$ . Prove that  $a_2 = b_2 = c_2 = d_2 = 0$ .

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**Problem 3** Does it exist a permutation of the numbers  $1, 2, \dots, 1992$  such that the arithmetic mean of arbitrary two of the numbers is not equal to any of the numbers which is placed between these two numbers in the permutation?

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