P 94. Let x, y, z, n be non-zero integers, $n \geq 2$, and $x^n + y^n = z^n$. Apart from the case $(3a)^2 + (4a)^2 = (5a)^2$, show that x, y, z cannot be in arithmetic progression.

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P 95. A well known characterization of artinian semi-simple rings is that every right ideal be a direct summand. Show that it suffices that every maximal right ideal be a direct summand.

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P 96. Call the elements $a_1, \ldots, a_{2n+1}$ of the abelian group G balanced if whenever one of them is removed the remaining can be split into two sets of n each such that the sum of the n elements in the first set equals the sum of the n elements in the second set. G is balanced if for every n

$$a_1, \ldots, a_{2n+1} \text{ balanced } \Rightarrow a_1 = \ldots = a_{2n+1} .$$

Show that G is balanced iff its torsion subgroup is a 2-group, e.g., if G is torsion-free. (This problem arose from conversation with N. S. Mendelsohn, who pointed out that additively balanced real numbers are equal; the result also shows that multiplicatively balanced non-zero reals are equal.)

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