A Simple or Deep Mathematical Problem?

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Abstract: We introduce and solve a new type of mathematical problem. Developing this problem further it might obtain new important properties.

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1 Introduction

In an anonymous way the following problem was posed here in Mendoza.

Consider the following four natural numbers, ordering in a graded manner:

$$\begin{aligned} 224 &= a \\ 426 &= b \\ 628 &= c \\ 8 &= d \end{aligned} \tag{1}$$

and a fifth one, namely:

$$16 = e \tag{2}$$

The posed mathematical problem is described as following.

Perform any simples combinations of the numbers labeled by a, b, c, d in such a way the numerical result is $16 = e$. This problem is so general that I have not seen anywhere something similar.

We try the easiest way. Take, the longest integer in the appearance (1):

$$c = 628$$

and rest the number

$$b = 426$$

where result is:

$$\begin{array}{c} - \begin{array}{r} c = 628 \\ b = 426 \end{array} \\ \hline (c - b) = 202 = f \end{array}$$

Doing the next operation:

$$\begin{array}{c} - \begin{array}{r} a = 224 \\ f = 202 \end{array} \\ \hline (a - f) = \ 22 = g \end{array}$$

and finally

$$\begin{array}{c} - \begin{array}{r} g = 22 \\ d = \ 8 \end{array} \\ \hline (g - d) = 16 = e \end{array}$$

and in this way we have found an answer of the problem.

If we change the variables from a's to x's the previous problem as we have solved in the linear way is transformed to an integer linear system as follows:

$$x_4 = x_1 - x_2$$
$$x_5 = x_4 - x_3$$
$$x_7 = x_6 - x_5$$

As a simple further example we have the following trivial example

$$15 = 30 - 15$$
$$1 = 15 - 14$$
$$9 = 10 - 1$$

$x_4 = 15,\ x_1 = 30,\ x_2 = 15,\ x_5 = 1,\ x_4 = 15,\ x_3 = 14,\ x_7 = 9,\ x_6 = 10.$ This problem with side conditions, might be seen rather important. Another fact is concerned with the possibility of reducing the operations in the first example dividing by 2 the entire set of members, those it is reducible by the amount of two. However it admit only a reducibility and therefore the reduced expression is irreducible.

2 Further Remarks and Important Comments

Up to now we have made some simple remarks, but simple and relatively important related with much of the contents of the important book of linear algebra and applications by Poole [2]

Consider now the problem having two twos

$$\begin{array}{c} 2 \\ 2 \\ \hline 4 \end{array}$$

the having problem for any operations, we have to derive four. There are two immediate solutions, namely:

$$2 + 2 = 4$$

and

$$2^2 = 4$$

The simple fast, determine a major idea for relative to many important subjects of pure and applied mathematics. The potentiality of the study of the new subject to be developed is enormous. If we change the operators acting on the left hand, one is sure to obtain a great relationship with all the material, equations mathematical by Aczel [1], mathematical analysis and applications by Rey Pastor J. Pi Calleja and Trejo [3].

References

[1] J. Aczel, H. Oser: *Lectures on functional equation and their applications* Courier Co. 2006

[2] D. Poole: *Algebra lineal.* Thomson

[3] J. Rey Pastor, P. Pi Calleja, C.A Trejo: *Analisis Matematico.* Vol I. Kapelusz 1957

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