General Mathematics Vol. 7 /1999

About some diophantine equations with restrictions

Dumitru Acu

Abstract

?????

1991 Mathematical Subject Classification ...

1. Ivan Niven [7] starts his study about diophantine equations by determining the fractions $\dfrac{\overline{ax}}{\overline{xb}}$ for which we can write

$$\frac{\overline{ax}}{\overline{xb}} = \frac{a}{b}\ , \tag{1}$$

where $\overline{ax}$ and $\overline{xb}$ are the numbers of two digits written in the numeration basis 10. The trivial case $a = b = x$ will not be taken into consideration.

From (1) we obtain

$$(10a + x)b = (10x + b)a\ , \tag{2}$$

which is a diophantine equation, where a, b, x are restricted to be nonzero digits in the numeration basis 10.

From (2) we will have

$$x = \frac{9ab}{10a - b} \ ,$$

which leads us to the solutions of the equation (1):

$$(3) \qquad \frac{1(6)}{(6)4} = \frac{1}{4} \ , \quad \frac{2(6)}{(6)5} = \frac{2}{5} \ , \quad \frac{1(9)}{(9)5} = \frac{1}{5} \text{ and } \frac{4(9)}{(9)8} = \frac{4}{8} \ .$$

In brakets it was written the digit (number) with which the simplification of the fraction has been made, and we will use this convention further, too.

One can see that the simplification of the fractions from (3)does not respect the common rules of simplification of the fractions. We could say that we have "mysterious" simplifications, but with correct results. This kind of fractions with "mysterious" simplifications are used in recreative mathematics as well as in the didactic of mathematics ([4], [5], [6], [7]).

A more general problem would be to determine the numbers

$\overline{ax_n x_{n-1} \ldots x_1}$

Bibliografie

[1] , , .

[2] , , .

[3] , , .

[4] , , .

[5] , , .

[6] , , .

[7] , , .

Department of Mathematics

University "Lucian Blaga" of Sibiu

Str. I. Raţiu 5

2400 Sibiu

Romania

E-mail: dacu??sciences.sibiu.ro