

Puzzle 3: Miller puzzle

Problem: Find a solution to the system or equations

$$a_1(10a_2 + a_3) = 100a_4 + 10a_5 + a_6 = 100a_4 + 10a_5 + a_6 = (10a_7 + a_8) * a_9$$

where (a_1, \dots, a_9) is a permutation of the 9 numbers $1, \dots, 9$. In short $a_1 * a_2a_3 = a_4a_5a_6 = a_7a_8 * a_9$.

Solution: Brute force search shows that there are exactly 4 solutions:

$$\vec{a} = (2, 7, 8, 1, 5, 6, 3, 9, 4)$$

$$\vec{a} = (3, 5, 8, 1, 7, 4, 2, 9, 6)$$

$$\vec{a} = (4, 3, 9, 1, 5, 6, 7, 8, 2)$$

$$\vec{a} = (6, 2, 9, 1, 7, 4, 5, 8, 3)$$



Subject: arithmetic, addition and multiplication

Source: This is one of the classical Canterbury puzzles.

http://www.transum.org/software/SW/Starter_of_the_day/students/hot/MillersPuzzle.asp