THE SOLUTIONS OF SOME DIOPHANTINE EQUATIONS

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In the theory of Diophantine equations, is well known the equation $a^x + b^y = z^2$. The literature contains a very large number of articles on such equations [1–6].

In this paper, we solve the equations:

$$3^x + b^y = z^2, b \in \{40, 360, 3240, 29160\},$$

where x, y, z are non-negative integer numbers.

Theorem 1. *The Diophantine equation* $32^x + 40^y = z^2$ *has exactly five integer non-negative solutions* $(x, y, z) \in$*{(1,0,2),(2,1,7), (2,3,253), (4,1,11), (4,2,41)}.*

Theorem 2. *The Diophantine equation* $3^x + 360^y = z^2$ *has exactly five integer non-negative solutions* $(x, y, z) \in$ *{(1,0,2),(4,1,21), (6,1,33), (8,2,369), (8,3,6831)}.*

Theorem 3. *The Diophantine equation* $3^x + 3240^y = z^2$*has exactly six-integer non-negative solutions* $(x, y, z) \in$*{(1,0,2),(2,1,57), (6,1,63), (8,1,99), (12,2,3321), (14,3,184437)}.*

Theorem 4. *The Diophantine equation* $3^x + 21960^y = z^2$ *has exactly six integer non-negative solutions* $(x, y, z) \in$ *{(1,0,2),(4,1,171), (8,1,189), (10,1,297), (16,2,29889), (20,3,4979799)}.*

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