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SOME DIOPHANTINE REPRESENTATIONS RELATED TO $\binom{PX}{QX}$

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ABSTRACT

Diophantine representations of binomial coefficients play important roles in the discussion about Hilbert's tenth problem. In this paper, for fixed P and Q , with only seven natural number unknowns we give Diophantine representations of the relations $Y = \binom{PX}{QX}$ and $\binom{PX}{QX} \equiv Y \pmod{Z}$. Furthermore, when $X > 1$, for any positive integer N we may respectively require that the unknowns lie between N and $\Phi(P, Q, X, Y, N)$, N and $\Psi(P, Q, X, Y, Z, N)$, where Φ and Ψ are Kalmar elementary functions. For the related relations $Z = C_X$ (Z is the X -th Catalan number), X pow 2 (X is a power of 2) and the prime set (under Jones' conjecture), we have similar results on their Diophantine representations.