

Fermat's Christmas Theorem

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Fermat's Christmas Theorem is a beautiful and simply stated theorem. It is called Fermat's Christmas Theorem because Fermat announced a proof of the theorem in a letter to Mersenne dated December 25, 1640.

Fermat's Christmas Theorem (aka Fermat's theorem on sums of two squares) states that an odd prime number p can be expressed as

$$p = r^2 + s^2$$

where $r, s \in \mathbb{N}$, if and only if $p \equiv 1 \pmod{4}$.