3. Determine the recursion relation for $T_n = P_n + Q_n$ where P_n is the arithmetic progression 3, 7, 11, 15, 19, ⋯ and Q_n is the geometric progression 2, 6, 18, 54, ⋯ .

4. Determine the recursion relation for $T_n = 2^n + F_n^2$ given that the recursion relation for F_n^2 is

$$F_{n+1}^2 = 2F_n^2 + 2F_{n-1}^2 - F_{n-2}^2 .$$

5. Determine the recursion relation for $T_n = 5L_n^2 + (-1)^{n-1} + 4F_n$.

(See page 544 for solutions to problems.)

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A SHORTER PROOF

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In his article (April 1967) on 1967 as the sum of squares, Brother Brousseau proves that 1967 is not the sum of three squares. This fact can be proved more briefly as follows:

If $1967 = a^2 + b^2 + c^2$, where a, b and c are positive integers, then, as Brother Brousseau has shown, a, b and c are all odd. Then $a = 2x + 1$, $b = 2y + 1$, and $c = 2z + 1$, where x, y and z are integers.

Consequently,

$$\begin{aligned} 1967 &= (2x + 1)^2 + (2y + 1)^2 + (2z + 1)^2 \\ &= 4x^2 + 4x + 4y^2 + 4y + 4z^2 + 4z + 3. \end{aligned}$$

Then

$$1964 = 4x^2 + 4x + 4y^2 + 4y + 4z^2 + 4z .$$

Dividing by 4, we get

$$491 = x^2 + x + y^2 + y + z^2 + z ,$$

[Continued on page 551.]

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