ELEMENTARY PROBLEMS AND SOLUTIONS

Edited by
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Send all communications regarding Elementary Problems and Solutions to Professor A. P. Hillman, Dept. of Mathematics and Statistics, University of New Mexico, Albuquerque, New Mexico 87106. Each problem or solution should be submitted in legible form, preferably typed in double spacing, on a separate sheet or sheets, in the format used below. Solutions should be received within five months of the publication date.

Contributors (in the United States) who desire acknowledgement of receipt of their contributions are asked to enclose self-addressed stamped postcards.

B-238 Proposed by Guy A. R. Guillotte, Cowansville, Quebec, Canada.

Can you guess WHO IS SHE? This is an easy simple addition and SHE is divisible by 29.

$$\begin{array}{r} \text{WHO} \\ \text{IS} \\ \hline \text{SHE} \end{array}$$

B-239 Proposed by L. Carlitz, Duke University, Durham, North Carolina.

Let $p > 0$, $q > 0$, $u_0 = 0$, $u_1 = 1$ and $u_{n+1} = pu_n + qu_{n-1}$ $(n \geq 1)$. Put

$$\left\{ \begin{matrix} n \\ k \end{matrix} \right\} = u_n u_{n-1} \cdots u_{n-k+1} / u_1 u_2 \cdots u_k, \qquad \left\{ \begin{matrix} n \\ 0 \end{matrix} \right\} = 1.$$

Show that

$$(*) \qquad \left\{ \begin{matrix} n \\ k \end{matrix} \right\}^2 - p^2 \left\{ \begin{matrix} n \\ k-1 \end{matrix} \right\} \left\{ \begin{matrix} n \\ k+1 \end{matrix} \right\} > 0 \qquad (0 \leq k \leq n) .$$

B-240 Proposed by W. C. Barley, Los Gatos High School, Los Gatos, California.

Prove that, for all positive integers n, $3F_{n+2}F_{n+3}$ is an exact divisor of

$$7F_{n+2}^3 - F_{n+1}^3 - F_n^3 .$$

B-241 Proposed by Guy A. R. Guillotte, Cowansville, Quebec, Canada.

If $2F_{2n-1}F_{2n+1} - 1$ and $2F_{2n}^2 + 1$ are both prime numbers, then prove that

$$F_{2n}^2 + F_{2n-1}F_{2n+1}$$

is also a prime number.

B-242 Proposed by J. Wlodarski, Proz-Westhoven, Federal Republic of Germany.

Prove that

$$\binom{n}{k} \div \binom{n}{k-1} = F_m \div F_{m+1}$$

for infinitely many values of the integers m, n, and k (with $0 \le k < n$).

B-243 Proposed by J. Wlodarski, Proz-Westhoven, Federal Republic of Germany.

Prove that

$$\binom{n}{k} \div \binom{n+1}{k} = F_m \div F_{m+1}$$

for infinitely many values of the integers m, n, and k (with $0 \le k \le n$).

ERATTA FOR

A CHARACTERIZATON OF THE FIBONACCI NUMBERS SUGGESTED BY A PROBLEM ARISING IN CANCER RESEARCH

Please make the following changes in "A Characterization of the Fibonacci Numbers Suggested by a Problem Arising in Cancer Research" by Leslie E. Blumenson, appearing on pp. 262-264, Fibonacci Quarterly, April 1972.

Page 263, line 11: For "$N^2 = 2$," read "$N = 2$";

Page 264, fourth line from bottom of page: For "+" read "•";

Page 264, Eq. (6): For "+" read "•";

Page 292, Eq. (7): For "+" read "•".