# THE FIBONACCI QUARTERLY 

## THE OFFICIAL JOURNAL OF <br> the fibonacci association



NUMBER 5

## CONTENTS

## PART I - ADVANCED

Arrays of Binomial Coefficients Whose Products are Squares . . . . . Calvin T. Long 449
Generalized Fibonacci Polynomials. . . . . . . . Marjorie Bicknel/ and V. E. Hoggatt, Jr. 457
Periodicity Over the Ring of Matrices. . . . . . . . . . . . . . R. J. DeCarli 466
Special Determinants Found within Generalized Pascal Triangles . . . . . . . V. E. Hoggatt, Jr., and Marjorie Bicknel/ 469
Note on a Combinatorial Algebraic Identity and its Application . . . . . L. C. Hsu 480
A Solution to the Classical Problem of Finding Systems of Three Mutually Orthogonal Numbers in a Cube Formed by Three Superimposed $10 \times 10 \times 10$ Cubes

Joseph Arkin 485
A Further Analysis of Benford's Law . . . . . . . . . . . . . W. A. Sentance 490
A Fibonacci-Related Series in an Aspect of Information Retrieval. . . Michael F. Lynch 495
Advanced Problems and Solutions . . . . . . . . . . Edited by Raymond E. Whitney 501
PART II - ELEMENTARY
On the Number of Divisions Needed in Finding the Greatest Common Divisor . . Dale D. Shea 508
A Primer for the Fibonacci Numbers: Part XIII . . . . . . . . . Marjorie Bicknell 511
A Fibonacci Probability Function . . . . . . . . . . . . . . Harold D. Shane 517
Some General Fibonacci Shift Formulae . . . . . . . . . . . Frank J. D. Trumper 523
More Hidden Hexagon Squares . . . . . . . . . . . . . . . Carl F. Moore 525
The Balmer Series and the Fibonacci Numbers. . . . . . . . . . . J. Wlodarski 526
A Polynomial with Generalized Fibonacci Coefficients . . . . . . . Bruce W. King 527
Another Proof for a Continued Fraction Identity . . . . . . . . . . Furio Alberti 533
On the Periodicity of the Terminal Digits in Fibonacci Sequences. . . Daniel Lance Herrick 535
Geometric Proof of a Result of Lehmer's . . . . . . . . . . . . Charles W. Trigg 539
Fibonacci and Apollonius . . . . . . . . . . . . . . . . Walter W. Horner 541
A Method for Constructing Singly Even Magic Squares . . . . . . Jerome Rothstein 543
The Z Transform and the Fibonacci Sequence . . . . . . . . . William L. Mathis 545
On Generalized Fibonacci Quaternions . . . . . . . . . . . . M. N. S. Swamy 547
Elementary Problems and Solutions . . . . . . . . . . . Edited by A. P. Hillman 550
Volume Index . . . . . . . . . . . . . . . . . . . . . . . . . 554

DECEMBER

# THE FIBONACCI QUARTERLY <br> the official journal of the fibonacci association <br> DEVOTED TO THE STUDY <br> OF INTEGERS WITH SPECIAL PROPERTIES 

## CO-EDITORS

V. E. Hoggatt, Jr. Marjorie Bicknell

EDITORIAL BOARD
H. L. Alder

John L. Brown, Jr.
Brother A. Brousseau
Paul F. Byrd
L. Carlitz
H. W. Eves
H. W. Gould
A. P. Hillman David A. Klarner Donald E. Knuth
C. T. Long
M. N. S. Swamy
D. E. Thoro

WITH THE COOPERATION OF

| Terry Brennan | D. A. Lind |
| :--- | :--- |
| Maxey Brooke | James Maxwell |
| Calvin D. Crabill | Sister M. DeSales McNabb |
| T. A. Davis | Gerald Preston |
| John H. Halton | D.W. Robinson |
| A. F. Horadam | Azriel Rosenfeld |
| Dov Jarden | Lloyd Walker |
| Stephen Jerbic | Charles H. Wall |
| L. H. Lange |  |

L. H. Lange

The California Mathematics Council

All subscription correspondence should be addressed to Brother Alfred Brousseau, St. Mary's College, California 94575. All checks ( $\$ 8.00$ per year) should be made out to the Fibonacci Association or the Fibonacci Quarterly. Two copies of manuscripts intended for publication in the Quarterly should be sent to Verner E. Hoggatt, Jr., Mathematics Department, San Jose State University, San Jose, California 95192. All manuscripts should be typed, doublespaced. Drawings should be made the same size as they will appear in the Quarterly, and should be done in India ink on either vellum or bond paper. Authors should keep a copy of the manuscript sent to the editors.

The Quarterly is entered as third-class mail at the St. Mary's College Post Office, Calif., as an official publication of the Fibonacci Association.

The Quarterly is published in February, April, October, and December each year.

