Notes 104.01 to 104.11

| Irrationality of $\sqrt{2}$ with determinants | Samuel G. Moreno, Esther M. García-Caballero | 143 |
|--|---|-----|
| Unifying Wilson's and Fermat's congruence theorems | Sourav Koner | 146 |
| On periods of Fibonacci numbers using modular arithmetic on the Binet formula | Jawad Sadek, Russell Euler | 150 |
| The complementary cubic | R. W. D. Nickalls | 155 |
| Some finite extensions of the rational numbers | Andrzej Nowicki | 159 |
| A consecutive squares property | Paul Stephenson | 160 |
| An inequality for the altitudes of the excentral triangle | Martin Lukarevski | 161 |
| Finding triangles with given circum-medial triangle | Hans Humenberger | 164 |
| A harmonic range for the triangle | J. A. Scott | 168 |
| Alternating series in an equilateral triangle – two Proofs Without Words | Stephan Berendonk | 170 |
| The curious story of a very old puzzle | Owen Nichols | 171 |
| Teaching Note | | |
| An easy way to Brahmagupta's formula for the area of a cyclic quadrilateral | Joerg Meyer | 174 |
| Problem Corner | Nick Lord | 176 |
| Student Problems | Lewis Roberts | 184 |
| Reviews | | 187 |

CONTENTS

Articles

| Reasoning as a mathematical habit of mind | Mike Askew | 1 |
|--|--|-----|
| Worst average encountered highway velocity | Jennifer Switkes and Randall Swift | 12 |
| An arithmetical question related to perfect numbers | Paul Lescot | 20 |
| Matrix zeros of polynomials | Damjan Kobal | 27 |
| Convexity of $y = E(x)$ defined by $x^y = y^x$ | Alan F. Beardon and Russell A. Gordon | 36 |
| Limits and second order ordinary differential equations | Glyn George | 44 |
| Notes on the Brocard points and angles of a triangle | Sadi Abu-Saymeh and Mowaffaq Hajja | 49 |
| Constructing tetrahedra with given face areas | Michael Fox | 63 |
| The Thébault configuration keeps on giving | Raymond Viglione | 74 |
| The Lie group approach to solving differential equations | Rory Allen | 82 |
| What is the significance of $b^2 = \frac{1}{2}(3 + \sqrt{5})ac$? | K. Robin McLean | 107 |
| Matrices that are similar to their inverses | Grigore Călugăreanu | 116 |
| Desargues, Pascal and Kirkman | John R. Silvester | 125 |
| On the relative error between the binomial and the hypergeometric distribution | Ulrich Abel | 136 |

© The Mathematical Association 2020 Typeset by Bill Richardson

CAMBRIDGE UNIVERSITY PRESS



Printed in the UK by Bell & Bain Ltd.

ISSN 0025-5572