LETTER FROM THE EDITOR

If you only know the Marquis de L’Hôpital from the rule that bears his name, then have a look at our opening article for 2022. L’Hôpital was the author of what is generally considered the first calculus textbook, and Fred Kuczmarski presents a convincing case that this work holds treasures for modern readers. In particular, he explains L’Hôpital’s exceedingly clever geometrical approach to the problem of constructing tangents to curves. Nowadays we tend to take calculus for granted, but the pioneers of the subject still have much to teach us.

The calculus theme continues with our next article, from Hans Musgrave and Ryan Zerr. They note that while Riemann based his approach to integration on filling out areas under curves with rectangles, it is also possible to use triangles as the approximating shape. A benefit of this approach, as explained so lucidly in their article, is that it leads to some interesting results on infinite series.

If you prefer discrete mathematics, then have a look at the article by Therese Aglialoro and Robert Hochberg. They take their inspiration from the venerable Rubik’s cube. Specifically, they consider a dodecahedral variant of the cube known as the Megaminx. They consider the combinatorial problem of constructing various snake-like patterns on this puzzle. The investigation leads them to the problem of enumerating Hamilton circuits on the dual graph of the dodecahedron. I especially enjoyed reading their article since it is a reminder that interesting mathematics does not necessarily require dense thickets of notation.

Tien Chih and Demitri Plessas apply insights gleaned from Google’s famous PageRank algorithm to the problem of ranking heavyweight boxers. Along the way they discuss topics from linear algebra, probability, and statistics. Brett Hemenway and David Hemenway make an interesting observation about measures of diversity in a population—that most individuals will find themselves among people who are “more like them” than the aggregate statistics indicate. Mathematically, this is reminiscent of the famous “friendship paradox” from sociology, which is the observation that most people have fewer friends than their friends have.

We round out our collection of articles with two shorter pieces. Şahin Koçak, Yunus Özdemir, and Gökçe Özkaya offer some insights into the p-adic numbers, as well as into subtle questions involving the Gromov-Hausdorff measure on compact metric spaces. And Quang Hung Tran brings us home with a new proof of Pitot’s theorem from Euclidean geometry. That is the one that says a convex quadrilateral has an inscribed circle precisely when the lengths of its two pairs of opposite sides have the same sum. This result has been known since the eighteenth century, but Tran’s proof is impressive for its novelty and clarity.

We also have proofs without words, problems, reviews, and a report on the 50th USA Mathematical Olympiad. Truly we are starting 2022 in style!

Jason Rosenhouse, Editor