A Word from the Editor

The editorial board of the *Mathematics Exchange* is pleased to present this latest issue containing five articles produced from a collection of authors at various stages of their careers. This group, which includes undergraduate students, professors, and even a high school student, has produced a nice collection of articles to be of interest to all undergraduate students of mathematics and we hope you enjoy the fruits of their labor. We certainly appreciate their effort to share their new discoveries as well as appreciate how they inspire and motivate our readership to follow their example in sharing their love for mathematics. We believe that getting students involved in publishing mathematics is a true milestone in helping them find their (permanent) place in the mathematical community and we are honored and proud to be a part of that endeavor.

The first article studies a model of our climatic system, analyzing the dependence on parameters, with an eye out for when the system can be crucially perturbed by even small changes in human CO_2 emission patterns. Alignment with current theories of global warming is also addressed.

The second article explores a point of overlap in mathematics and music. More precisely the authors use Markov Chain Analysis to analyze the chord progressions of compositions by four well-known composers to find that they agree with the chord progression models of each musical era.

Article three takes us into the world of number theory. After introducing us to Fermat's Little Theorem the author proves an extension of this key result to the Gaussian integers.

Staying in the world of number theory, the authors of article four analyze known elementary methods used to bound $\pi(n)$, the number of primes less than or equal to n. They then extend these methods to show improved bounds and demonstrate in what sense these are optimal.

The final article on pure mathematics was motivated by the question "Are the metric spaces $(\mathbb{Z}, d_2)$ and $(\mathbb{Z}, d_3)$, where d_g is the word metric associated with the infinite generating set $\{g^n | n = 0, 1, 2, \dots \}$, quasiisometric?" Our authors recover several known results with novel methods, as well as derive new results.

We hope that you will enjoy reading this issue of the *Mathematics Exchange* and, as always, we welcome and encourage ideas on how we can better serve our readers.

Rich Stankewitz