UNDERGRADUATE MATH SEMINAR

The first math seminar of the spring term is an interdisciplinary one, jointly sponsored by the Math, ECBE, and Physics and Astronomy Departments.

DATE: **Thursday, April 11**

Time &   **1:00**, **with lunch beforehand**

Location: **Karp 005**, *not Bailey Hall!*

In this seminar, **Professor Luigi Vanfretti** from the Electrical, Computer, and Systems Engineering Department at **Rensselaer Polytechnic Institute (RPI)** will present the following talk:

Professor Luigi Vanfretti, RPI

Towards Cyber-Physical Electrical Power Systems: where the laws of nature and the rules of algorithms collide!

Abstract: Electrical power networks are undergoing unprecedented changes. On one hand, the adoption of distributed energy resources and renewable energy sources (RES), both of which have a large degree of variability in small time-scales, puts challenges to the traditional, historical-and-experience-based design and operation of electrical power networks. On the other hand, digitization and automation, opens opportunities for a more carbon neutral electrical energy system by helping to harmonize these new energy sources with the rest of the power grid, not without also bringing along the potential threats of the cyber world. This talk aims to give an overview of these challenges, and to present different research efforts conducted by the presenter to address how to transform today's electrical grid into a cyber-physical power system. This includes the development of an experimental facility to conduct, real-time hardware-in-the-loop simulation experiments of power networks with "cyber" assets. This approach allows to characterize how the interaction of systems governed by the laws of nature will interact with engineered systems governed by rules of algorithms. Finally, with the rise of electrification in transport, and in particular aircraft, and the rise of more autonomous machines, the talk will also discuss the need for development of a new course on modeling and simulation for cyber-physical systems (CPS) and the teaching approach adopted which brings a "digital" toolbox and know-how to the next generation of electrical engineers that will have to increasingly deal with complex CPS.

New Book by Professor Kim Plofker Published

Let's congratulate Union math **Professor Kim Plofker** on the release of her new book, *Sanskrit Astronomical Tables*.

From the publisher: "*This groundbreaking volume provides an up-to-date, accessible guide to Sanskrit astronomical tables and their analysis. It begins with an overview of Indian mathematical astronomy and its literature, including table texts, in the context of history of pre-modern astronomy. It then discusses the primary mathematical astronomy content of table texts and the attempted taxonomy of this genre before diving into the broad outlines of their representation in the Sanskrit scientific manuscript corpus. Finally, the authors survey the major categories of individual tables compiled in these texts, complete with brief analyses of some of the methods for constructing and using them, and then chronicle the evolution of the table-text genre and the impacts of its changing role on the discipline of Sanskrit jyotiṣa. There are also three appendices: one inventories all the identified individual works in the genre currently known to the authors; one provides reference information about the details of all the notational, calendric, astronomical, and other classification systems invoked in the study; and one serves as a glossary of the relevant Sanskrit terms.*"
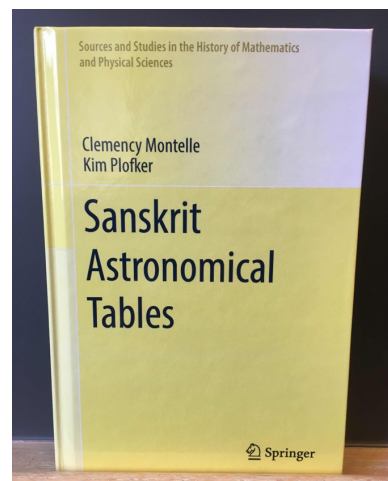
Calculus Help Center Open for Business!

Looking for help with your calculus homework? Stuck with a tricky integral? WeBWorK giving you woes? Then seek assistance from the friendly student tutors at the math department's Calculus Help Center (CHC)!

During the spring term, the CHC offers calculus tutoring three nights per week, **Sunday, Tuesday, and Thursdays, from 7:30-10:00pm in Sorum House**. The CHC supports calculus courses up through Math 117. Check it out!

Spring Break: Professor Kim Plofker Presents at Conference in Cambodia

During finals week of the winter term, **Professor Kim Plofker** traveled to Phnom Penh, Cambodia as an invited speaker at the International Conference on the Role of Zero in the History of Mathematics. From Cambodia, Professor Plofker sent an email and a few pictures for the math newsletter:

"Hello everybody! Phnom Penh is stew-hot but really amazing, and the conference on history of zero at Royal University of PP went great. Here [right, then below left to right] are pictures from a conference lunch with fresh mandarins and lychees right off the tree, me with one of the medieval inscriptions in the National Museum, and a close-up of the earliest known epigraphic instance of the decimal place-value zero (the little dot after the spiral-looking figure "6" right near the center of the photo) in another inscription from the late seventh century."

The inscription containing the zero, written in Old Khmer, reads "The Caka era reached 605 on the fifth day of the waning moon" according to Amir Aczel in his article, "The Origin of the Number Zero" on Smithsonian.com:

https://www.smithsonianmag.com/history/origin-number-zero-180953392/
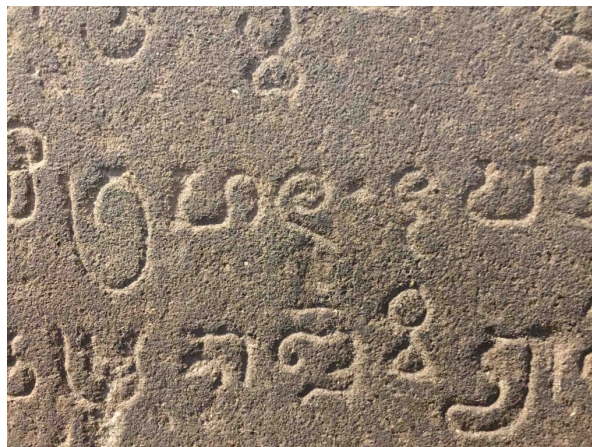
Problem(s) of the Newsletter – April 8, 2019

Last week's problem: Congratulations to Hoang Tran for submitting a correct solution to last week's problem. You may view solutions to the problem at the newsletter sites in Bailey Hall.

This week's problem: Find the sum of the digits of the integer $N = 9 + 99 + 999 + 9999 + \cdots + 99\ldots99$ where the last number in the sum has 321 digits (all 9).

Professor Friedman (friedmap@union.edu) will accept solutions until midnight Friday, April 12.