The Colorado State Torus

Edition 3 Summer 2025

Who Was Dr. Louis R. Weber?

Joe Geisz

Since the first time I walked through the front door of Weber, under the blue "MATHEMATICS" sign, I have been curious about the history, both of the Weber Building and the building's namesake, Dr. Louis R. Weber. Perhaps others may have a similar curiosity so I thought writing an article would be a great excuse to do a little research on Weber, both the man and the building.

The Weber building was originally the Chemistry building, built in 1923, it replaced the chemistry building that had burned down two years prior. In 1949 a windstorm damaged much of the roof, and while doing repairs a large addition was added on the western side, where the upstairs graduate student offices now are. A new chemistry building was built in 1971, so our building, at this point called "Old Chemistry", became the home of economics and math classes. In 1972, university policies changed allowing buildings to be named after people rather than the function of the building. The building was consequently renamed the "Weber" building in 1981 in honor of Dr. Louis R Weber.[1] But who was Dr. Weber?

As it turns out, Dr. Louis Weber was a professor in the CSU Physics department from 1938 until his retirement (as chair of the department) in 1965. Professionally, he was an accomplished physicist, with a PhD from the University of Michigan. Prior to CSU, he was head of the physics department at Friend's University in Wichita Kansas. During his tenure at Colorado State, he spent two years in Pakistan while he worked as a science adviser at the University of Peshawar. He was also a Fulbright lecturer in Iraq, the Philippines, and Colombia.

A 2009 physics department newsletter contained a short and personal biography of Dr. Weber. Written by a former student, the article is called "Dr. Louis R. Weber – My Favorite Teacher"[2]. He speaks mainly of Dr. Weber's love of teaching, his kindness to his students, and his love of science. For anyone who is interested in learning more about Dr. Weber, I recommend reading this article. His obituary, published in the Fort Collins Coloradoan says "He was elected a fellow in the Optical Society of America in 1970 in part because of a landmark paper on the far infrared spectrum of water vapor"[3]. He lived from 1901 until 1989.

[1] J.E. Hansen et al. *CSU's Sense of Place: A Campus History of Colorado's Land-Grant University.* Colorado State University Cooperative Extension, 2017. ISBN: 9781889143101.

[2] John Weaver. "Dr. Louis R. Weber – My Favorite Teacher". In: *Colorado State University Physics Department Newsletter* 19 (Mar. 2009), pp. 8–14.

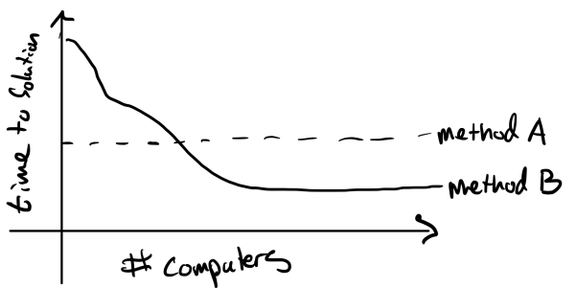
[3] Author Unknown. "Obituary: Louis R. Weber". In: *Coloradoan* (May 1989).

Adding Energy Metrics to Numerical Methods

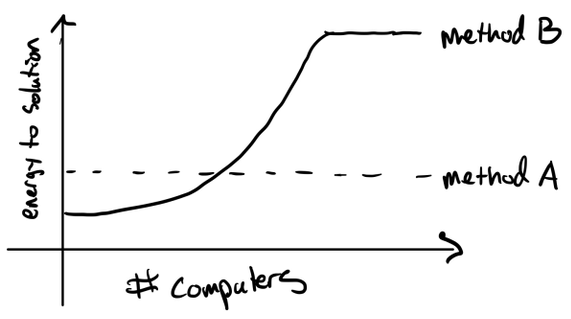
Jerett Cherry

My field of mathematics research holds some metrics dearer than others, to the detriment of informed choice. Methods in the field typically present the time to solution (**TTS**, how long it takes to compute a solution), the accuracy of the solution, and the ease of use as evidence that the method is worthwhile. This makes sense; when using some numerical method, I want an accurate solution, and I want it fast. However, if the only metrics we present are limited to time, accuracy, and ease, then we miss out on the energy costs required. Today, energy comes at a premium. Without adding ***Energy to Solution*** to the existing metrics, we ignore information that can inform energy usage.

Consider Method A and Method B which solve some problem. Assume Method A and Method B are both equally accurate and easy to use, but Method B allows the use of many computer processors, while Method A only works with one processor. A common plot you see in the literature looks like a TTS vs. # computers plot.



In this sketch, we see that if we do enough extra work, Method B produces an answer in less time than Method A. If TTS is the only measure of a method, you would rightly want to use Method B. But what you miss could look like the Energy to Solution vs. # computers plot.



Here, we see that the energy consumption the extra processors used in Method B vastly exceeds Method A. If you are energy limited (it's expensive to use lots of energy), then you should select Method A. Yet these sorts of energy metrics do not show up in the literature, so you cannot decide anything to do with energy.

I do not claim that Method A or Method B is better based on their energy usage. I just claim that without energy metrics we can't even have a conversation. Maybe the methods predict the 3D shape of a life-saving medicine, or maybe the methods solve the heat equation. We can make the argument that for medicine, we are happy to spend more precious energy for a smaller TTS. And we can make the argument that for the heat equation, maybe using an energy intensive method is not worth it. I can't answer definitively which is correct in either case. I only point out that without energy metrics we can't make an informed decision.

Energy metrics are vital today even outside of my field. For example, I read that training GPT-3 used approximately the same amount of energy as a person in Fort Collins uses in four months[4,5], not including what it costs to ask GPT something. Without a sense of how much energy it costs, who's to stop us from wasting energy asking silly questions, or let us ask important ones? Similar energy usage questions need answers for numerical methods. When presenting my numerical methods in the future, I'd like to give my readers a sense of how much energy my method uses. Then it's up to them to decide if this energy cost is too much for the type of problem I solve. It may be or it may not be. At least they can make the call.

[4] FCGOV. *Community Electricity Use Per Capita*. 2023.

[5] Dylan Patel and Afzal Ahmad. *Cost of Search Disruption-Large Language Model Cost Analysis*. 2023.

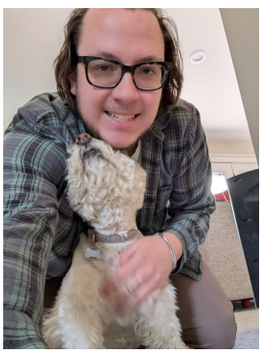
Foto del Mes

This month's photo is from The Undergraduate Directed Reading Program(DRP) presentations! Thanks to Ignacio for the photo.

Obituary

Departing Graduate Students

Dr. Kyle Salois



Kyle was a beloved graduate student at CSU who studied combinatorics with Maria Gillespie, and defended his dissertation on "Connections between Hessenberg Varieties and Chromatic Symmetric Functions". Kyle not only wrote the question of the week in the up stairs office, but Kyle also wrote every crossword for the Colorado State Torus. As a member and coach of the Sitting Ducks, inner tube water polo team, Kyle helped bring the team to near greatness, a legacy that will be forever remembered. Kyle served as the graduate student representative.

Kyle has accepted a position as a visiting assistant professor at St. Olaf College in Minnesota

Dr. Erin Dawson

Erin was a beloved graduate student at CSU who studied Tropical Geometry with Renzo Cavalieri, and defended her dissertation on "Tropical Tevelev degrees". Erin was a member and coach of the Sitting Ducks, inner tube water polo team where Erin helped bring the team to near greatness, a legacy that will be forever remembered. Erin served as the graduate student representative and was an organizer for the Greenslopes Mathematics Seminar.

Erin has accepted a position as a Postdoc at the University of Tübingen in Germany

Master Tyler Stephens

Tyler was a beloved graduate student at CSU who studied Math Education with Hortensia Soto, and defended his masters Thesis on "Applied Mathematics Through an Embodied Storytelling Lens".

Tyler has accepted a position at Front Range Community College in Fort Collins.

Problem of the Month

Let

$$\frac{p}{q} = \sum_{n=1}^{1319} \frac{(-1)^{n-1}}{n}$$

Show that 1979 divides p.

Congratulations to **Maria Gillespie** for being the first to solve the April Problem of the Month!

DANCE: Thanks for Helping Me Out!

I'm excited to announce that I got the job as a dance instructor at the Rec Center next semester!
Huge thanks to everyone who came out and supported me during my audition, you being there means a lot to me.

Classes will be held twice a week, 90 minutes each.
More details (exact days, times, how to sign up, etc.) will be shared as soon as I get more info from the Rec Center. Stay tuned!

LAST KARAOKE OF THE SEMESTER

Close out the semester with a night of music, colleagues, and fun songs!
Where: Tony's
224 S College Ave, Fort Collins, CO 80524
When: Thursday, May 15th, 9:00 pm

Bring your best songs and worst stage fright!

MATH 101-002 POSTER SESSION

Come check out what my dear 101 students have been working on for their final project!
Where: Weber 237
When: Tuesday, May 13th 10:00 AM - 5:00 PM

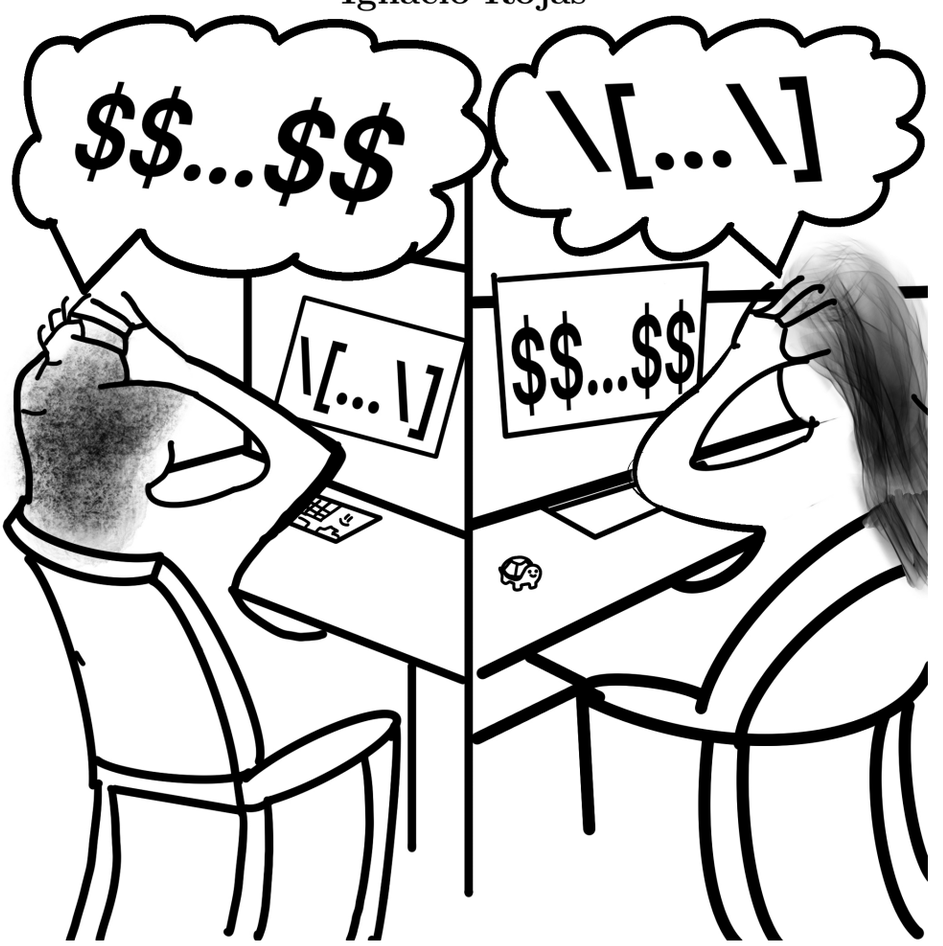
Swing by if you're around, it'll be great to see you there!

Call to Contribute

We hope you have enjoyed the third edition of The Colorado State Torus. Do you have any ideas for articles, opinion pieces, or new sections? Do you have an error to point out in a seminar time? Just want to give us a piece of your mind? We would love to hear from you! The CST is made possible through contributions from many people across the department. Send any articles, comics, suggestions, announcements, ads, or anything you wish to be included to **MATH_ColoradoStateTorus@mail.colostate.edu** at least one week before the end of the month. The editorial board will review any ideas and hopefully include them in an upcoming issue. Thank you!

Summer Comics

Ignacio Rojas



April PotM solution

Consider the sum

$$\begin{aligned} S &= 77 + 757 + 7557 + ... + 7\overbrace{5...5}^{98}7 \\ &= \frac{7\overbrace{5...5}^{99}7 + m}{n} \end{aligned}$$

Here, $m, n < 3000$. Find $m + n$.

Solution

Let $a_r = 7\underbrace{5...5}_{r}7$ for $r \in \mathbb{Z}_{>0}$. We notice that

$$a_{r+1} = a_r + 7\underbrace{0...0}_{r+2} - 2\underbrace{0...0}_{r+1} = a_r + 68\underbrace{0...0}_{r+1}$$

So:

$$\begin{aligned} a_0 &= 77 \\ a_1 &= 680 + a_0 \\ a_2 &= 6800 + 680 + a_0 \\ &= 68(10^2 + 10) + a_0 \end{aligned}$$

So we see:

$$\begin{aligned} a_r &= 68(10^r + 10^{r-1} + ... + 10) + a_0 \\ &= 68\frac{(10^{r+1} - 10)}{(10 - 1)} + a_0 \\ &= \frac{680}{9}(10^r - 1) + a_0 \end{aligned}$$

Adding these up:

$$\begin{aligned} S &= \sum_{r=0}^{98} a_r \\ &= a_0 + \sum_{r=0}^{98}(\frac{680}{9}(10^r - 1) + a_0) \\ &= a_0 + \frac{680}{9}\sum_{r=0}^{98} 10^r - \frac{680}{9}(98) + 98a_0 \\ &= 99a_0 - \frac{680}{9}(98) + \frac{680}{9}(\frac{10^{99} - 10}{10 - 1}) \\ &= 99a_0 - \frac{680}{9}(98) + \frac{680}{9^2}(10^{99} - 10) \\ &= 99a_0 + \frac{680}{9^2}(10^{99} - 10 - 98(9)) \end{aligned}$$

We take a moment to simplify this last expression

$$\begin{aligned} 10^{99} - 10 - 98(9) &= 10^{99} - 1 - 9 - 9(98) \\ &= 10^{99} - 1 - 9(99) \\ &= (10^{99} - 1) - 9^2.11 \end{aligned}$$

So we find:

$$\begin{aligned} S &= \sum_{r=0}^{98} a_r \\ &= 99a_0 + \frac{680}{9^2}((10^{99} - 1) - 9^2.11) \\ &= \frac{1}{9}\Big(9^2.11a_0 + \frac{680}{9}(10^{99} - 1) \\ &\qquad - \frac{680}{9}(9^2.11)\Big) \\ &= \frac{1}{9}\Big(\frac{680}{9}(10^{99} - 1) + a_0 \\ &\qquad + (9^2.11 - 1)a_0 - \frac{680}{9}(9^2.11)\Big) \end{aligned}$$

Let us compare this with the given sum:

$$\begin{aligned} S &= \frac{a_{99} + m}{n} \\ &\frac{1}{9}\Big(\frac{680}{9}(10^{99} - 1) + a_0 \\ &\qquad + (9^2.11 - 1)a_0 - \frac{680}{9}(9^2.11)\Big) \\ &= \frac{1}{n}\left(\frac{680}{9}(10^{99} - 1) + a_0 + m\right) \end{aligned}$$

We cannot reduce this due to the a_0 in the sum. On comparing the terms, we see that:

$$\begin{aligned} n &= 9 < 3000 \\ m &= (9^2.11 - 1)a_0 - \frac{680}{9}(9^2.11) \\ &= (9^2.11 - 1)77 - 680.9.11 \\ &= 1210 < 3000 \end{aligned}$$

Thus, we see that

$$m + n = 1210 + 9 = 1219$$

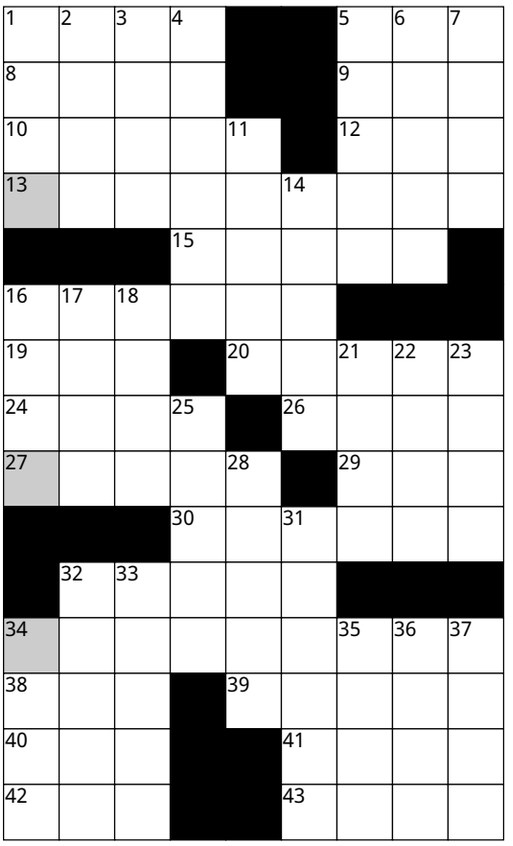
May Issue Crossword

ACROSS

1 Dapper fellow
5 When you might get there (abbr.)
8 Continuously
9 Game loved by combinatorialists
10 Grandmothers
12 Steal
13 Star system closest to our sun
15 Eyelashes
16 Peaceful
19 Cry of triumph
20 "It's all ___ to me!", or a hint to this puzzle's theme
24 Where you might find 34-across
26 It's often found on faces
27 Any of the X-men
29 Fix, as a contest
30 Studio stands
32 Humiliate
34 Jolly Roger, for instance
38 The "law", in Spain
39 Poker option
40 Singer Yoko
41 Protein source
42 Torque symbol
43 Ice cream brand

DOWN

1 Group born after Zoomers
2 Rescue mission, briefly
3 Hawaiian goose
4 Hypnotized state
5 Boredom
6 Royal accessory
7 Prefix meaning "both"
11 Sharp pain
14 Aware
16 Famed orca
17 Sun spot?
18 One of saturn's moons
21 Dublin's land, poetically
22 Male version of Amelia
23 Frat party fixtures
25 "That's ___ trick!"
28 Stun gun
31 Oil in the international aisle
32 Stadium
33 Habitat for the American alligator
34 First episode in a TV series, often
35 Made haste
36 "My word!"
37 Bo and Sunny, for the Obamas



April Solutions