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NAZARETH COLLEGE MATHEMATICS DEPARTMENT

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Do you wish the newsletter came every week? To get you through the gaps of length x between the issues, you can sign up for Monday Morning Math, hand delivered to your inbox during the semester. And if you want to write one of the vignettes, even better!

In This Issue:

Our Newsletter

The Taylor Swift

Hi Friends!

The Nazareth Math Department through the Ages

Our department spent last year working on a Program Review: an opportunity to reflect on how our program has changed over the years. The college has an archive, and what was supposed to be a quick look through papers turned into two days of looking through decades of catalogs. It was fascinating to see just how much things have changed over the years, and also how much they have stayed the same.

The first catalog was in 1927-28: "The Sisters of St. Joseph of Rochester announce the re-opening of their College 1927-28, on September fourteenth. The present College building is located at 981 Lake Avenue, on the Lake Avenue car line and a five minutes' walk from the Dewey Avenue line." This was the Glass House, so named because of its many windows, and the Dewey Ave line was on the Rochester Subway, a light-rail system.

There wasn't any mention of majors, but there were five math courses, four of which were for a full year. "Higher Algebra with Geometry and Trig" was required of all frosh, and lasted a year. Other year-long courses were "Analytical Geometry," "Calculus," and "Theory and Practice of Teaching Math in Secondary Schools." There was also a one-semester "Differential Equations" class.

Just one year later, in 1928-29, there were now nine mathematics courses, including the one-semester courses "Solid Geometry," "Projective Geometry,", and "Spherical Trig and Solid Analytical Geometry." You could almost get a math major just taking geometry courses! "History of Math" was also offered, which is a particular treat since the two editors of this newsletter have been teaching that course for the past quarter-century.

The 1929-30 catalog brought more new courses, as the one-year classes began to be broken down into semesters. This was the first catalog showing faculty members: Sister Rose Miriam, Ph.D., taught Chemistry and Math, while William C. Flaherty, B.A., taught Math and Logic.

In 1932 there was a B.S. in Math – a Bachelor of Science degree, in addition to the Bachelor of Arts degree in Mathematics that is currently taught. Interestingly, the only Bachelor of Science degrees offered at Naz at this time were in Math, Chemistry, and Secretarial Studies. By 1942, however, Math was back to (only) being a B.A. degree, except for a time in the '70s when there were B.S. degrees both in Math/Science with Elementary Education and in Math/Social Science with Elementary Education.

The number of courses continue to grow. By 1942 Nazareth College had moved to its current location in Pittsford, though the mailing address read "Brighton Station", and there were now 17 math courses available, including the Mathematical Theory of Statistics: "The theory of averages, dispersion, types of distributions, curve fitting and correlation theory will be taught with numerous practical illustrations."

Big changes occurred in 1947: the Department of Mathematics was named for the first time, headed by Philip E. Creighton. Sister M. Dorothea Kunz was also listed as an Instructor of Mathematics! She continued to teach in the department, but in 1950-51 was noted as being on leave, and when she returned she was now an Assistant Professor. (We're guessing she was away studying on her leave: she earned an M.A. from Cornell, and is also described as having further study at Columbia.) By 1953 Sr. Dorothea was Chair of the department. By the time your editors arrived at Naz, in 1997 and 2005, she had retired but would still visit the department, which was always a treat.

Returning to the 1940s, in 1947 the catalog also had a change in format. There was still a LOT of geometry: including 104 (Plane and Solid Analytic Geometry), 105 (Solid Geometry), 411 (Synthetic Projective Geometry), 412 (Analytic Projective Geometry), and 413 (Advanced Plane Geometry). All the courses were 3 credit classes, including Calculus, which was broken into three semesters. This is particularly interesting because a few years ago we (apparently once again) moved all of our own courses to all being 3 credits, including Calculus, which had been 4 credits, and Problem Solving, which had been just 1 credit.

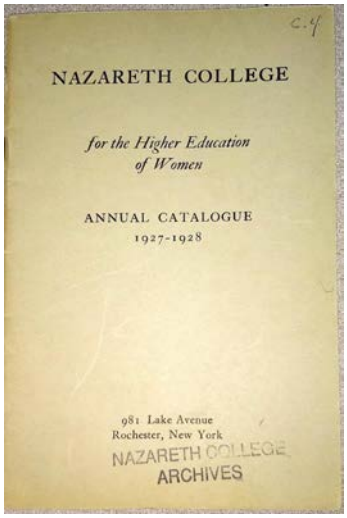
The changes came more rapidly after this. There was a note in 1950 that the College had expanded to include graduate studies (but not in math, although during our work lifetimes we've had a Master's in Education with a concentration in math come and go). In 1961 there were not one but two courses in Abstract Algebra, which we admit to being jealous of.

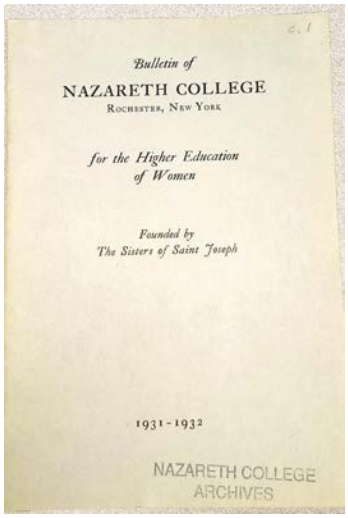
In 1951 the department was "Mathematics and Physics", although there were not enough physics courses offered for a major in that subject. This lasted for about twenty years, at which point the physics courses were moved to the sciences, where they reside today. In 1983 the department began offering a Bachelor of Science degree in Computer and Information Science, and the following year changed the department name to "Mathematics and Computer Science". This continued for nearly twenty years, but by then there were very few computer science majors, and so the program was discontinued, and the computer science courses moved to what was then the Department of Business. The name of the department returned to "Mathematics" soon after. As we look at possibly changing our name once again, now that our department offers a major in Ethical Data Science in addition to Mathematics, it is heartening to realize that we are part of a longer tradition of blending Mathematics with applications.

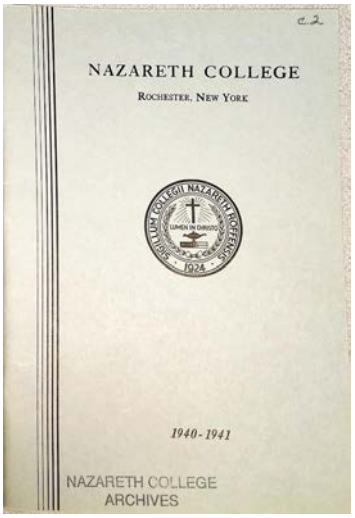
Time and phone batteries only permitted a perusal through the catalogs he journey through the 1990s, but you can follow along on the visual aspect of the journey over the next few pages....

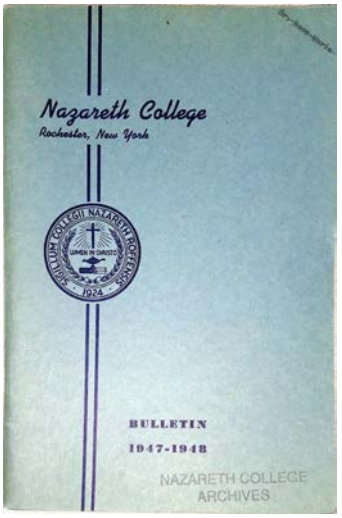
Ever wonder where our logo came from? From what Heather remembers, the Undergraduate Association made a quilt in the late 1990s, inviting each club to create a square. The Math Club made this, in these colors of material, and we've used it ever since!

The first catalog was in 1927-1928. For the first few decades the catalogs (sometimes called bulletins) were fairly simple.

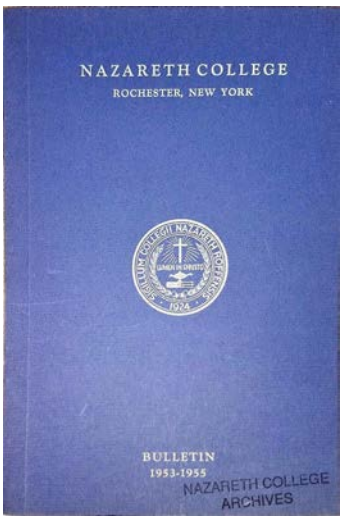


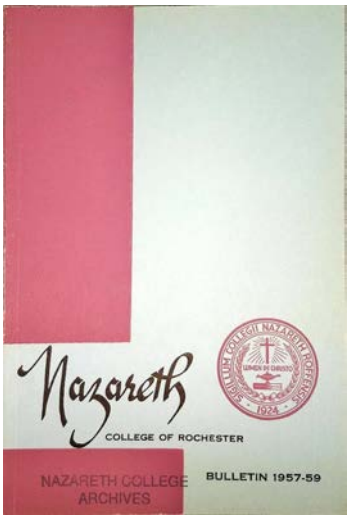


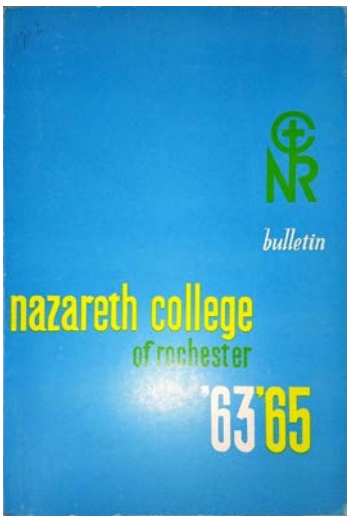




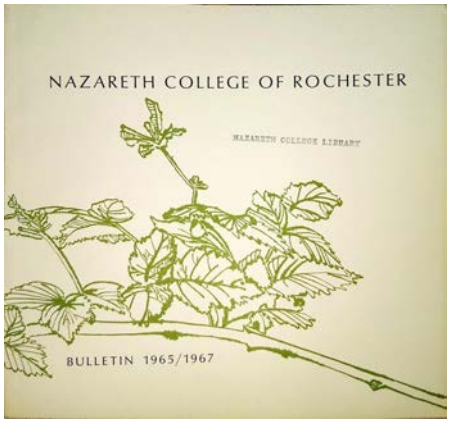
In the early 1950s the catalogs began to be issued for two years at a time, and gradually became more colorful and distinct.

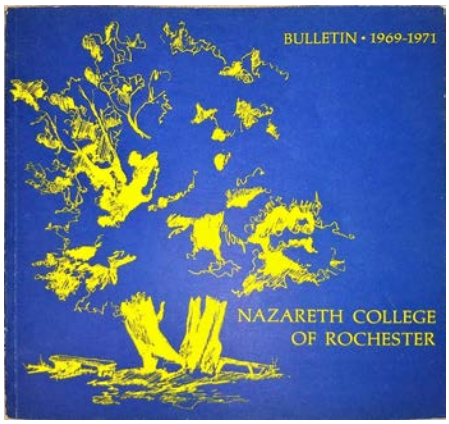




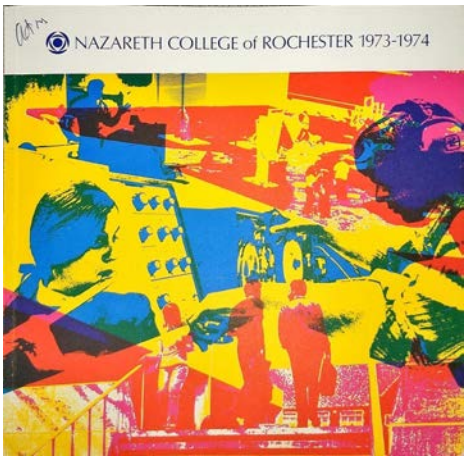


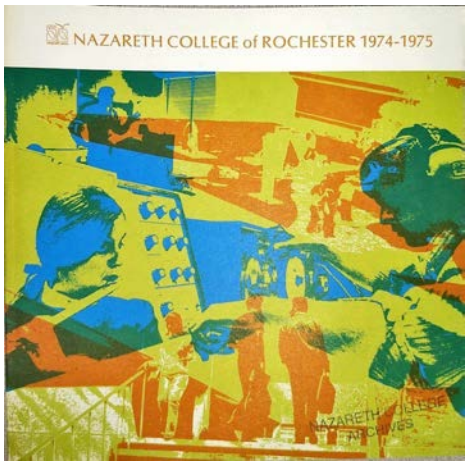
Starting in the mid-1960s the catalogs became square and began to feature trees.



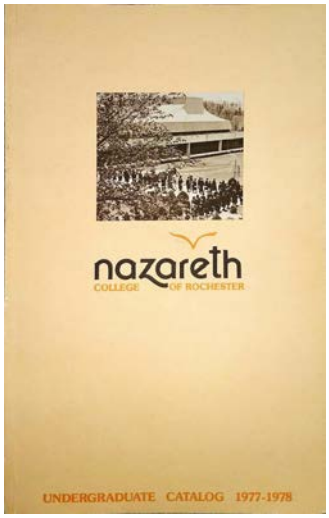


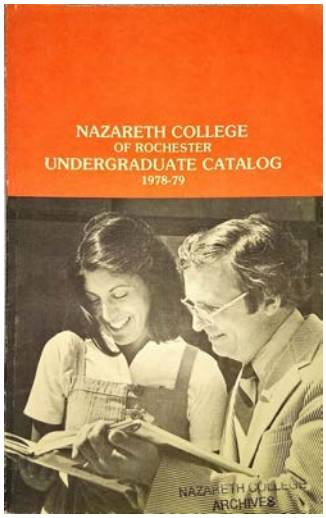
In the ’70s things briefly got wild...

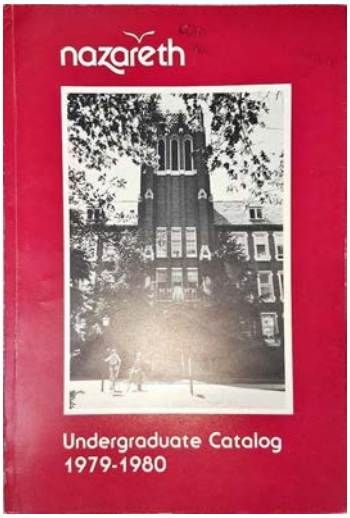




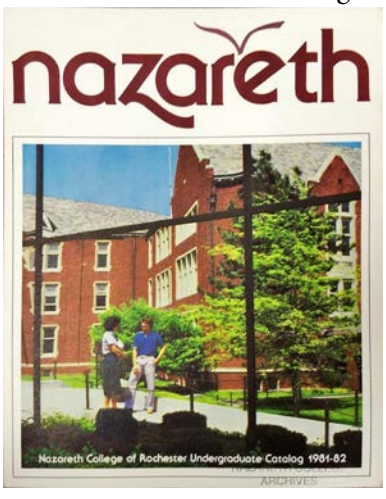
...before calming down again.

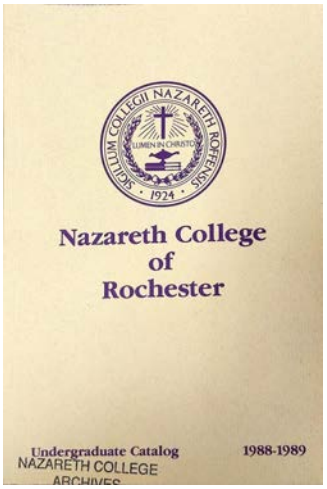


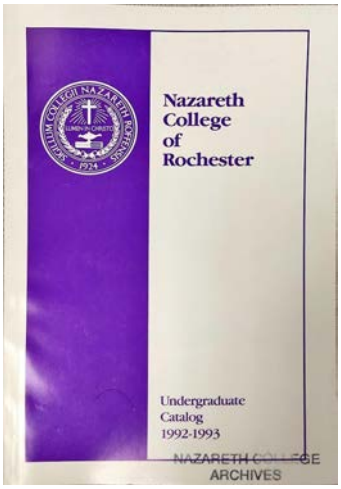




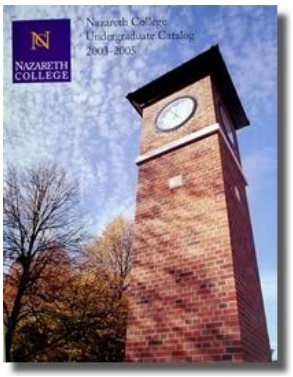
The 1981 catalog featured a *color* photograph on the cover! This style continued for a while, but in 1988 the catalogs suddenly reverted back to an older simplicity and logo (even though by 1988 the college had been religiously independent for some years). This reversion went through at least 1992-1993, which was the last catalog photographed before the phone battery gave out.







Feeling nostalgic? The catalogs from 2003 on are available online at http://catalog.naz.edu/index.php



Brook Taylor

Brook Taylor (Aug 18, 1685–Dec 29, 1731) was a mathematician and robe connoisseur. He is probably best known for Taylor's Theorem, which says (roughly) that every differentiable function can be approximated by a polynomial, and Taylor series, everyone's favorite part of Calculus.

Taylor received undergraduate and graduate degrees in law from Cambridge, but studied math extensively. Like many mathematicians of the time, much of his work concerned physics and astronomy. His most famous result, the theorem which bears his name, was included in a paper on astronomical refraction, and went largely unnoticed until 1772 — 41 years after his death — when Lagrange called it "the main foundation of differential calculus".

Want to look like Brook Taylor? Head on over to H&M!

This just-came-out-of-the-shower-and-my-hair-is-still-wet look also shows up with the portrait of Leonard Euler (1707-1783) by Jakob Emanuel Handmann, which he painted in 1753, a mere 33 years after Louis Goupy (probably) painted the portrait of Brook Taylor.

Our Favorite Taylor Series

Heather's favorite Taylor Series is the one for $e^{i\theta}$ because it's the start of the proof that $e^{i\theta}=\cos(\theta)+i\sin(\theta)$.

$$e^{i\theta} = \sum_{k=0}^{\infty} \frac{(i\theta)^k}{k!} = 1 + \theta i - \frac{\theta^2}{2} - \frac{\theta^3}{6}i + \frac{\theta^4}{24} + \dots$$

Matt's favorite Taylor series is the one for $\ln(1+x)$ because it's easier to use than $\ln(x)$ and it has an easy pattern to remember.

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$$

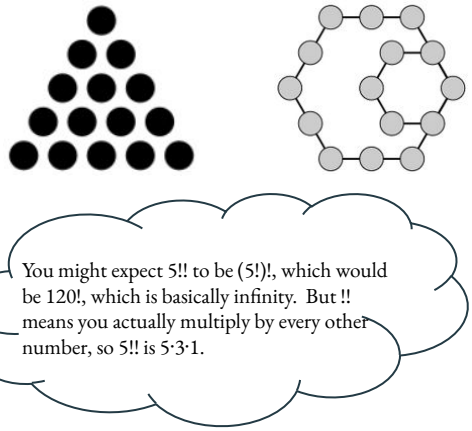
😀💥What's YOUR favorite Taylor series? 👀👋

Issue Sponsor

This issue is brought to you by the number 15. Here's our favorite:

Fourteen facts about the number 15:

- 15 is a semiprime, as it is the product of two distinct primes.
- 15 is the 5th triangular number.
- 15 is also the 3rd hexagonal number.
- 15 is a "repdigit" in base 2 (1111) and base 4 (33).
- There are 15 partitions of 7.
- 7 is almost half of 15.
- 15 is the 15th positive integer.
- The smallest number that can be factored by Shor's Algorithm on a quantum computer is 15.
- In hexadecimal, 15 is represented by F.
- In bingo, 15 is found under the B.
- On the periodic table, 15 is P.
- In the alphabet, the 15th letter is O.
- It is possible to construct a regular pentadecagon (15-gon) using only straightedge and compass.
- 15 = 5!!, the double factorial of 5.



You might expect 5!! to be (5!)!, which would be 120!, which is basically infinity. But !! means you actually multiply by every other number, so 5!! is 5·3·1.

Problems

Solutions to Problems 14.2

14.2.1: 1868, 2307

14.2.2: A number is cool iff it is the product of two distinct primes.

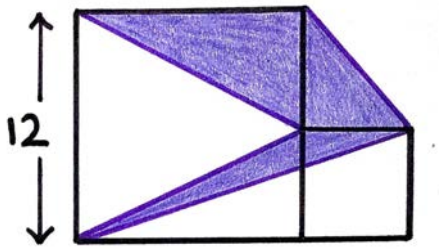
14.2.3: 12 = 4*3*1*1*1*1*1 = 4+3+1+1+1+1+1+1, 12 = 6*2*1*1*1*1 = 6+2+1+1+1+1. Any number with multiple pairs of proper factors can be written in multiple ways by padding with 1s.

Problems 15.1

15.1.1: Find 8 whole numbers so that the sum of any 6 of them is unique and the total of all 8 is as small as possible.

15.1.2: Suppose $a_0 = 1$ and $a_{n+2}=2a_n - a_{n+1}$ for $n = 0, 1, 2, \ldots$ If $a_n > 0$ for all n, what is the value of a_{10}?

15.1.3: (from Catriona Agg, @Cshearer41 on Twitter): Two squares. What is the shaded area?



Send solutions, squares, circles, awards, waffles, Quordle scores, alumni news, podcast recommendations, or suggestions to Heather (hlewis5@naz.edu) or Matt (mkoetz1@naz.edu).