
VITAL SINES

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A newsletter of the Plattsburgh State University Mathematics Department

In appreciation of 22/7

Todd Ford writes: "In high school, when figuring out problems involving π , we were told to let $\pi=22/7$. Being young and naive, we just came to accept this. Then came college. Professors now tell us that π is not equal to $22/7$ but is just a rational approximation to π . π is to be left as π in college. Dr. Northshield's talk ["Fractions and Farey Sequences", to the Math Club on Oct. 21] brought back $22/7$ with an all-new appreciation. $22/7$ is a good rational approximation to π with a small denominator that is easy to work with. We know π may be represented as a non-repeating decimal whose first few places are given by 3.1415926.... To find a low denominator rational approximation, we try fractions such as $19/6=3.1666...$, $22/7=3.1428571...$, $25/8=3.125$, $28/9=3.111...$, etc. Here we see that $22/7$ is the closest to π of these. In fact, it is correct to the first 2 decimal places. If we continue to increase the denominator, we find approximations correct to the first 4,6, and 8 decimal places using $333/106=3.141509...$, $355/223=3.1415929...$, and $103993/33102=3.1415926...$, respectively. Dr. Northshield, using a continued fraction technique, obtained these approximations. However, these approximations are not so easy to work with as $22/7$. Therefore, we see how special $22/7$ really is."

A little math joke

A discouraged graduate student in pure math sees an announcement for a lecture on "The Theory of Gears". "Aha", she thinks, "gears – something down to earth, practical, concrete – just what I need now". The day of the lecture arrives and she eagerly goes to hear it. The speaker is introduced and begins: "The theory of gears having a real number of teeth is well known..."

For what is important when we give children a theorem to use is not that they should memorize it. What matters most is that by growing up with a few very powerful theorems one comes to appreciate how certain ideas can be used as tools to think with over a lifetime. One learns to enjoy and to respect the power of powerful ideas. One learns that the most powerful idea of all is the idea of powerful ideas.
~~Seymour Papert

Common integration is only the memory of differentiation... The different artifices by which integration is effected, are changes, not from the known to the unknown, but from forms in which memory does not serve us to those in which it does.
~~A. DeMorgan

Congratulations

to all math majors who are graduating this December:
Rebecca Charette, Frank Cote, Tomoko Omori, Deborah Trombly, and Jessica Villnave.

Keep in touch with us - we would love to know how you are doing. Special good wishes to our foreign students who will be returning home - hope you take with you happy memories of the Plattsburgh State math department. To those who are heading off for student teaching - hope you enjoy it! And remember, it gets easier as you go along. Finally, to those who will be doing Block next semester, keep in touch, and come visit us when you miss your math!

Words of Wisdom

If a C is better than nothing and if nothing is better than life itself, does that mean that a C is better than life itself?

If at first you don't succeed, destroy all evidence that you tried.

Monday is an awful way to spend a seventh of your life.

The sooner you fall behind, the more time you'll have to catch up.

If you think nobody cares about you, try missing a couple payments.

BLOCK II

Hello everyone, it's Tim Kermani here writing to you about the Block II experience in the Education Department. Block II has been a lot of fun, with the majority of us double majors being in either the high schools or middle schools. I have had a blast so far since being in the school. We go and observe for five weeks, and each week we are there for four half days and one full day. After the first week I took over my host teacher's third and fourth period classes and I am loving it. I get to decide what examples to use, what the homework is, and when we are going to have quizzes. I realize now that I have definitely picked the right profession to go in to. For those of you in the math department right now.....Don't Give Up. It get's a lot easier in the education department. Good luck everyone.

Alumni News

Jeff Mortalette writes: “Greetings from Arizona! I am teaching with my fiancée on an Indian Reservation in Arizona. This is my third year teaching middle school math (and I know fractions and percents like the back of my hand!). My girlfriend, who is Swedish, and I will be getting married next summer in Sweden.

Jim Butler writes: “I earned my BS in Electrical Engineering and my MS in applied math and have been teaching at a community college in California for eight years”.

Victoria Seawall-Butler gave a talk to education block classes EDU 372, 395, and 364 on November 22. She talked about her experiences as a first year high school math teacher (at Guilderland Public High School) and gave advice to the students regarding things they could do to ease the transition to teaching their own classes. (reported by *Don Kaupelis*)

Size doesn't matter.

A Ph.D. degree represents an ability to conduct independent research. It generally caps many years of study and culminates in a paper called the dissertation. The dissertation itself need not be long. The shortest math dissertation is apparently the one by Eva Kallin: “A non-local function algebra”, 13 pages, Univ. of California at Berkeley, 1963. In it, she constructed a counterexample to a conjecture which “had interested many specialists”.

As for the shortest math talk, this from Burton's *Elementary Number Theory*: Edouard Lucas worked a test whereby he was able to prove that the Mersenne number M_{67} was composite; but he could not produce the actual factors. At the October 1903 meeting of the American Mathematical Society, the mathematician Frank Nelson Cole had a paper on the program with the somewhat unassuming title “On the Factorization of Large Numbers.” When called upon to speak, Cole walked to a chalk board and, saying nothing, proceeded to raise the integer 2 to the 67th power; then he carefully subtracted 1 from the resulting number and let the figure $[M_{67}]$ stand. Without a word he moved to clean part of the board and multiplied, longhand, the product $193,707,721 \times 761,838,257,287$. The two calculations agreed. The story goes that, for the first and only time on record, this venerable body rose to give the presenter of a paper a standing ovation. Cole took his seat without having uttered a word, and no one bothered to ask him a question. (Later, he confided to a friend that it took him 20 years of Sunday afternoons to find the factors of M_{67}).

The life of a mathematician is dominated by an insatiable curiosity, a desire bordering on passion to solve the problems he is studying. ~~ J. Dieudonne

Illustrating $24/6=4$

Some students were asked to write a word problem for fifth graders which illustrates the equation “24 divided by 6 equals four”. Here are several responses:

- A) “If you have 24 inches of rope for a swing set and each swing needs 4 inches, how many swings can you make?”
- B) “24 runners ran around a 6 meter track. How much did each runner run?”
- C) “If the room is 24 feet in length and 6 feet in width, how many sides does it have?”

Thanks to Jennifer Beineke, Western New England College.

As life is action and passion, it is required of a man that he should share the passion and action of his time, at peril of being judged not to have lived.”

~~Oliver Wendell Holmes

Problems

With this issue, we leave you with two problems (from Professors Bodenrader and D'Aristotile respectively). Please submit your solution to Prof. Northshield. The first and/or best solution will permit you to choose a prize from the ‘big box’ o’prizes’ in Northshield’s office.

1) Find $f(x)$ if, for each point P on the graph of g, the two shaded regions A and B have equal areas.

2) Enumerate the rational numbers between 0 in any way you choose (i.e. list them r_1, r_2, r_3, \dots) and let $F(x)$ be the sum of all $1/2^k$ such that $r_k < x$.

a) Show that $F(x)$ is strictly increasing (if $a < b$ then $F(a) < F(b)$).

b) Show $F(x)$ is not continuous at $1/2$.

c) Show that if $F(x)$ is continuous at $1/2^{1/2}$.

(A prize for each!)

Closing Credits

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