



# Villanova Sum Times

October 2011



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**Pure mathematics is the world's best game. It is more absorbing than chess, more of a gamble than poker, and lasts longer than Monopoly. It's free. It can be played anywhere - Archimedes did it in a bathtub.**

~Richard J. Trudeau

## Message from Dr. Norton

Welcome to a new academic year in a newly-renamed department! The Department Formerly Known As Mathematical Sciences is now the Department of Mathematics and Statistics. (I suppose since Prince

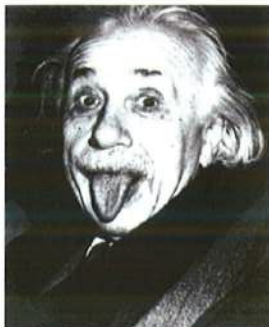


Dr. Douglas Norton-  
Dept. of Mathematics  
and Statistics Chair

changed his name to  $\sigma$  in 1993, the reference to The-Artist-Formerly-Known-As-Prince is not a good fit for the age group of the intended audience of this newsletter...) The name change is simply truth in advertising, a more public acknowledgment of the mix of mathematicians and statisticians that make up our merry band. We're still here to help you learn how to interpret, set up, analyze, solve, prove, model, and explain quantitative and theoretical and logical and geometrical questions and problems in the world around you (as well as demonstrate how to write run-on sentences... and use ellipses freely...). As the French say, *plus ça change, plus c'est la même chose*: the more things change, the more they stay the same. (Sounds like a Calculus problem...) The extension of the 80-degree days into September and the rainfall pattern that had us looking for animals headed two-by-two towards a large boat are finally yielding to why we usually call this the Fall semester. Enjoy the change of seasons; enjoy the part that remains the same: our ongoing attempt to facilitate upgrades to your internal statistical and mathematical processors. Have a good semester.

## DON'T FORGET!

**Make an appointment with your advisor soon! You'll need one prior to your registration date/time. All advisors have their office hours posted at their office.**



“Politics are only a matter of present concern. A mathematical equation stands forever.”  
-Albert Einstein  
(...or until neutrinos are discovered.)

An infinite crowd of mathematicians enters a bar. The first one orders a pint, the second one a half pint, the third one a quarter pint... “I understand”, says the bartender - and he pours two pints.



## Spring 2012 MAT Electives:

### MAT 4310 **Stat Methods** - Dr. Paul Lupinacci

Section 001—TR from 1:00 p.m. to 2:15 p.m.

Section 002—From 2:30 p.m. to 3:45 p.m.

This course focuses on introductory statistical methods including data displays and summarization, probability distributions, point and interval estimation, hypothesis testing, categorical data analysis, regression and correlation.

### MAT 5920-001 **Epidemiology**—Dr. William Fleischman

TR from 1:00 p.m. to 2:15 p.m.

The class will explore “the very rich interplay between the ideas of mathematical modeling and the study of disease epidemics.” We will also connect the study with the role of disease in the history of civilizations. Topics include the role of disease in history, dynamics of epidemics, math models, threshold effects equilibrium and stability, just to name a few. Mathematical prerequisites: an understanding of the derivative, familiarity with differential equations, and algebra. Biological prerequisites: Not much except a fearlessness about reading and making some sense of non-technical material in a new discipline.

### MAT 5920-002 **Monte Carlo Methods** – Dr. Jesse Frey

TR from 4:00 p.m. to 5:15 p.m.

Monte Carlo methods are methods for answering questions via simulation. They are widely used in *finance*, *statistics*, and many other fields. Students who take this course will learn how to design Monte Carlo studies, how to implement them using the statistical computing package R, and how to appropriately assess the error in Monte Carlo estimates. Major course topics include random variables, Monte Carlo integration, Markov chains, Markov chain Monte Carlo, and the bootstrap. Each student will complete a project involving Monte Carlo methods.

**MAT 5400 Complex Analysis — Dr. Paul Pasles**

Section 001—MWF from 9:30 a.m. to 10:20 a.m.

Section 002—MWF from 11:30 a.m. to 12:20 a.m.

Many of your favorite theorems are true "for all real numbers." Aren't you tired of hearing that phrase over and over again? What about the other numbers? Aren't they just as real? In fact, plenty of algebra and calculus works just as well with complex numbers, and applications to the sciences and engineering show that these numbers are just as concrete as the so-called reals. This course will cover the fundamentals of complex analysis, including some neat theorems that make sense only when considered over the entire complex field. And the best part is, you can take the square root of a negative number whenever you darn well feel like it. (Note: Division by zero is still expressly forbidden by International Law.)

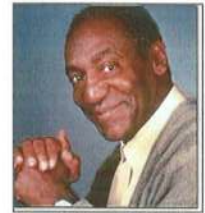
**MAT 5930 Topics in Algebra – Dr. Amanda Knecht**

MWF from 12:30 p.m. to 1:20 p.m.

This course is a continuation of MAT 3500. 3500 mainly concentrates on Groups. In 5930 we will dive a little deeper into the groups pool and then move on to rings and fields which are way cooler. In group theory, you only have one binary operation which is usually called addition. Rings and fields have two operations usually called addition and multiplication. Everyone knows that two is better than one. You know you were itching to multiply in 3500, but they just let you add. I will let you multiply until your heart is content. I will even let you take two nonzero numbers and multiply them together to get zero. I will let you concentrate on simple one variable polynomials instead of the crazy types of continuous functions you see in 3300. Come to 5930 and see the wild and beautiful side of Algebra!

 $\sin B$  $\frac{\sin B}{\cos B} = ?$  $\tan B$ 

=



Q: What did the zero say to the eight?  
A: Nice belt!

"There are 10 kinds of people in the world, those that *understand binary* and those that don't."  
- Anonymous

**HOPE TO SEE YOU NEXT SEMESTER!!!**





# Math Club!

The Math Club this year has many fun things planned. Our next few meetings include a *pumpkin carving contest*, making *flashcards for children in Philadelphia*, designing the math club **t-shirts** and a career night later in the semester. Come to the next meeting, **October 25th at 5:30** in the MLRC to show off your carving skills!

Hope to see you there!

For additional information on the Math Club, please contact Jessica Carroll (Jcarro08@villanova.edu).

Three statisticians go hunting. When they see a rabbit, the first one shoots, missing it on the left. The second one shoots and misses it on the right. Then, the third one shouts: "We've hit it!"

*Under New Management*

That's right! The Math Club is under new management. With one year of Villanova teaching under her belt, Dr. Amanda Knecht, a TCU and Rice University grad, has agreed to run the Villanova Math Club along with juniors Jessica Carroll (President), Erin Cuddy (Vice President) and Thomas Caruso (Treasurer). With enthusiasm and some fun ideas the Villanova Math community should expect some great things from the club this year!

## 5 REASONS TO ATTEND A MATH CLUB MEETING

1. Meetings are a good place to see that mathematicians are people too.
2. Can fill your closet with a plethora of Math Club T-shirts.
3. You eat an irrational amount of pi on pi day.
4. Statistics show your love of math will exponentially increase.
5. We never mix drinking and deriving.



With me, everything turns into mathematics.

-René Descartes

### Millenium Problem Spotlight:

In order to celebrate mathematics in the new millennium, The Clay Mathematics Institute of Cambridge, Massachusetts (CMI) established seven *Prize Problems*. The Prizes were conceived to record some of the most difficult problems with which mathematicians were grappling at the turn of the second millennium and to recognize achievement in mathematics of historical magnitude. To whomever solves one of these problems will be given international recognition, gratitude, and a \$1 million dollar prize funded by the CMI. The first problem the Sum Times will highlight is:

## THE RIEMANN HYPOTHESIS

Some numbers have the special property that they cannot be expressed as the product of two smaller numbers, e.g., 2, 3, 5, 7, etc. Such numbers are called *prime* numbers, and they play an important role, both in pure mathematics and its applications. The distribution of such prime numbers among all natural numbers does not follow any regular pattern, however the German mathematician G.F.B. Riemann (1826 - 1866) observed that the frequency of prime numbers is very closely related to the behavior of an elaborate function

$$\zeta(s) = 1 + 1/2^s + 1/3^s + 1/4^s + \dots$$

called the *Riemann Zeta function*. The Riemann hypothesis asserts that all *interesting* solutions of the equation

$$\zeta(s) = 0$$

lie on a certain vertical straight line. This has been checked for the first 1,500,000,000 solutions. A proof that it is true for every interesting solution would shed light on many of the mysteries surrounding the distribution of prime numbers.



"If I were to awaken after having slept for a thousand years, my first question would be: Has the Riemann hypothesis been proven?"  
- David Hilbert

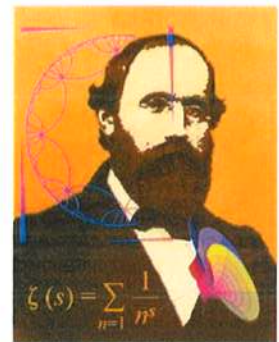
Son: "Dad, will you do my math homework for me tonight?"  
Father: "No son, it wouldn't be right."  
Son: "Well you can try."

### Puzzler Page!

### IT'S PRIME TIME!

1. How many of the three digit numbers that can be made from all of the digits 1, 3 and 5 (used only once each) are prime?
2. 12345 can be expressed as the sum of two primes in exactly one way. What is the larger of the two primes whose sum is 12345?
3. What three digit prime number has all prime digits and forms primes with its first two and last two digits?

Answers Below



"If I only had the theorems! Then I should find the proofs easily enough."  
- Bernhard Riemann

Prime Time: 1) None of them! All permutations of 1,3,5 are divisible by 3. 2) 1243; the other is 2, 3) 373.



**NUM8ERS**  
YOU CAN COUNT ON US

## UPCOMING DATES:

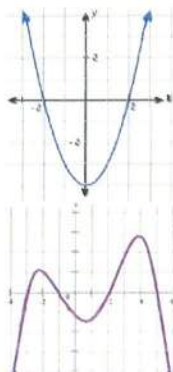
**October 10-14-**  
Break

**October 17-**  
Classes Resume

**October 21-**  
Undergraduate  
Advising begins –  
make an appointment  
with your advisor

**October 21-23-**  
Homecoming weekend

**October 28-**  
Majors fair – Villanova  
Room, Connelly Center



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## Job and Internship Information

Office for Undergraduate Students (OUS) and Career Services are great resources for any students interested in job or internship opportunities. Information will also be posted on the new Dept. of Mathematics and Statistics at Villanova University page in Facebook. Students should also fill out a profile on LinkedIn ([www.linkedin.com](http://www.linkedin.com)) to make other networking connections.

**GoNOVA** is a web-based career management system to help you manage your career development process. All undergraduate students have an account. Your username is your full Villanova email (ex: jane.doe@villanova.edu) and your password is: your banner id. Freshman will be uploaded in October.

For Alumni, Graduate School Students and Transfer Students, [click here](#) to register for an account. You will receive a confirmation email once your account has been activated.

To login, please go to <http://villanova.experience.com> This will direct you to the Villanova University login page. At the top of the page, type in your username and password and click Enter.

From the home page, you will see important messages and instructions from the career center. Please read these messages carefully!

To start, please complete the following initial steps:

**Complete your profile** by clicking on "View/Edit Profile Data" listed under the "Profile" heading in the top navigation bar. The more complete your profile is, the more we can help you connect with opportunities!

**Upload a resume** by clicking on "Upload a Document" listed under the "Documents" heading and following the simple steps to upload a resume. Your resume must be in Word or .rtf to begin the conversion process.

**Publish a resume** to a Resume Book for recruiters to view your information.

Click on "**Career Center Calendar**" listed under the "Calendar" heading to view upcoming events and opportunities offered by the career center.

If you're ready to begin looking for opportunities, click on "**Job Search**" listed under the "Jobs & Internships" heading to conduct a search.

If you're not sure what types of opportunities you're interested in, explore the different types of content listed under the "Career Research" heading.



### Math Learning Resource Center

Where: Old Falvey 2nd Floor (near the Writing Center)

Hours: Sunday 6:30-9:00pm, Monday—Thursday 1:00– 5:00pm and 6:30-9:00pm

Phone: 610-519-MLRC

Voicemail: 610-519-5193

Web Address: [www.villanova.edu/mlrc](http://www.villanova.edu/mlrc)

*Walk-in Tutorial Services ~ No appointment needed*

*Private Tutorial Service ~ 20 minute sessions ~ Call to set up appointment*

### A VERY HAPPY BIRTHDAY TO ALL OUR FALL BIRTHDAYS!

Michael Levitan—Sept. 12

Elise Pasles—Oct. 3

Bruce Pollack-Johnson—Oct. 4

Tony Stracciolini - Oct. 9

Bob DeVos—Oct. 19

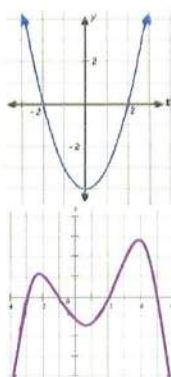
Alan Gluchoff—Oct. 25

Oswaldo Marrero—Nov. 5

Martin Kleiber—Nov. 11

Steve Chiacchiere—Nov. 12

Edel Lukens—Nov. 14



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#### *We're on the Web!*

*Search "Dept. of Mathematics and Statistics at Villanova University" on Facebook to like our page and get updates on what's happening here at VU!*

For any Comments or Questions Contact:

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**WISHING YOU A FUN AND SAFE FALL BREAK!**  
-from everyone in the Villanova Mathematics and Statistics Department



**And a very HAPPY HALLOWEEN too!!!**