

Math Mess

Department of Mathematics
St. Olaf College
Northfield, MN 55057

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This Week's Mathematics Colloquium

Title: Bioinformatics of Tuberculosis Latency

Speaker: Rob Rutherford, Biology, St. Olaf College

Time: Tuesday, March 30th, 1:30 pm - refreshments at 1:15

Place: SC 182

This Week's Colloquium

Approximately one third of the human population (roughly 2 billion persons worldwide) harbor viable, but nonreplicating, tubercle bacilli in their lungs. Most active cases of tuberculosis (TB) arise from this vast reservoir and attempts to reduce it with the use of antibiotics have been broadly unsuccessful. Innovative methods to combat this ancient pathogen are sorely needed.

The completion of the *M. tuberculosis* and other mycobacterial genomes offers an opportunity to find such new approaches. Open source tools like DNA microarrays, BioPerl and Blast are changing the way biology is done. The speaker will discuss how we are currently applying computer science and statistics to aid in the TB discovery effort at St. Olaf. The speaker will also discuss how the importance of mathematics, statistics, and computer science will continue to grow in biology.

Rob Rutherford is a member of the St. Olaf biology department, having arrived in 2003. His Ph.D., in genetics, is from the University of Wisconsin - Madison, and his undergraduate degree is from the University of Minnesota - Morris. Between earning his Ph.D. and coming to St. Olaf in 2003, Rob worked for several years as Helen Hay Whitney Postdoctoral Fellow at the University of California - San Francisco and as a senior scientist at Incyte Genomics, in Palo Alto. He has also taught at Coe College, in Iowa.

Putnam Congratulations

More people keep taking the Putnam each year, keeping up with current trends. Eighteen Oles were among the 3,615 Putnam participants on December 6, 2003, and all of us who attended both the morning and afternoon sessions earned at least one point - which was once again the median score! (out of 120.) We improved on our team ranking, moving up to 58th this year out of the 401 schools that had a team. Our top scorer was Chris

Ebert, whose 18 points were enough to squeeze him into the top 500 overall. Following Chris were eight more Oles in the top 1000 -- Scott Harris, Jason Saccomano, Jake Huseby, Michael Zahniser, Matthias Hunt, Adam McDougall, Paul Tveite, and Dan Visscher (all with scores in double-digits). Also posting positive scores were Will Mitchell, Sara Krohn, Mike Heggeseth, Haley Hedlin, and Joey Paulsen, all of whom are the bomb-diggity.

Last Week's Problem

The decimal expansions of $k/7$ for various k are very pretty. For any k relatively prime to 7, $k/7$ will have a repeating decimal expansion with period 6, eg $1/7 = .142857$ (with a bar over it). Find the smallest n such that for any k relatively prime to n , k/n will have a repeating decimal expansion with period 8.

The repeating decimals problem was solved by **Chris Ebert '06**, and **Bob Hanson** from Chemistry (in consultation with his son Ira). If a fraction has a decimal expansion which repeats every 8 digits, then it can be written as something/99999999. So the candidates for our n are the factors of 99999999. But some factors of 99999999 are also factors of 9, 99, or 9999, which would yield shorter periods. 99999999 factors as $3 \cdot 3 \cdot 11 \cdot 73 \cdot 101 \cdot 137$, so **73** is the smallest n with the desired property. This is the first time 73 has been the answer to the problem of the week in approximately 2 1/2 years. Congratulations to 73.

Problem of the Week

Looking into my crystal ball, I see successful, if slightly unusual, seasons from Twins Corey Koskie and Doug Mientkiewicz in 2004. Corey will have a slugging average of .600, which is not Barry Bonds, but it's pretty good. Corey will slug .533 before the All-Star break (160 total bases in 300 at-bats). After the break, he has 140 total bases in only 200 at-bats.

I'm cloudy on the reduced playing time, possibly an exploding milk bottle accident. I can foresee less about Doug - he also has a total of 500 at-bats, and his slugging average is less than Corey's both before the break and after the break, but in neither time period is his slugging percentage zero. Based on this information only, what is the highest possible slugging percentage Doug could have in 2004?

If you want to get the Mess problems ahead of time, they will be sent out on Thursdays on Molnar's math-probsolv email alias. Let him know if you would like to be added to the alias.

*** Please submit all solutions by Wednesday at 5 o'clock to David Molnar by e-mail (molnar@stolaf.edu) or by placing them in his box at OMH 201.

If you would like to receive a copy of the Math Mess in your P.O. Box weekly, please e-mail Donna Brakke at brakke@stolaf.edu.

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