MSCS Mess

This Week's Colloquium

Title: Palantir Project
Speakers: Aaron Etshokin, Anton Miakotin, Chris Mueller, David Middlecamp, Justin Von Stroh, Matt Handley, and Olaf Hall-Holt
Time: Tuesday, April 26th, 7:00 pm
Place: SC186

Come join in the official opening of the graphics lab and beginning of the Palantir Project: 7pm Tuesday in Science Center 186. After months of preparation and significant infrastructure development, we have a place for communication, visualization, and research that we hope will delight your senses. The presentation will include

- 3D stills and video, from on and off campus
- cool projects created during the graphics seminar
- research in computer vision

We hope that you will enjoy and consider using this space for your own projects. You'll be surprised how little is required to get started.
Come check it out: we'll provide the polarized glasses and the food.

[A joint production of the CS program and MDC/IIT]

Problem of the Week

What is the fifth digit from the end (the ten thousands digit) of the number

$$5^{5^{5^{5^{5}}}} \, ?$$

Yes, that is indeed (((((5 to the fifth) raised to the fifth) raised to the fifth) raised to the fifth).

*** Please submit all solutions by Wednesday at noon to Amelia Taylor (e-mail: ataylor@stolaf.edu) or by placing them in her box at OMH 201.

Phi Beta Kappa Scholars

Congratulations to MSCS senior students **Lauren Benson, Nicole Bohme, Carl Carlson, Anna Ericksen, Janette Herbers, Mark Kingsbury, Brian Linne, Thomas Loome, Chris Mueller, Andrea Rau, Mark Skeba, Michael Smith, Kristine Thomsen, Eli Townsend,** and **Heather Wiste** for their induction into the Phi Beta Kappa honor society on April 19th. MSCS seniors **Knut Christianson, Katherine James,** and **Daniel Sinykin** were inducted into the society earlier this year.

Last Week's Problem

Last week we had a calculus challenge that has at least 3 different solutions:

$$\int x^6 ? x^3 \sqrt[3]{x^3 ? 2}\,dx$$

Congratulations to **Adam McDougall '05** and **Paul Tviete '07**, Calculus 2 tutors extraordinaire for their their solutions. I know of at least three distinct possible solutions. I will include my two favorite, one of which is Adam's and the other Paul's.

Solution 1: First move one factor of x inside the square root. This gives

$$\int x^6 ? x^3 \sqrt[3]{x^3 ? 2}\,dx ? \int x^5 ? x^2 \sqrt[3]{x^6 ? 2x^3}\,dx$$

Now set $u ? x^6 ? 2x^3$,
so $du ? 6x^5 ? 6x^2\,dx ? 6\big(x^5 ? x^2\big)dx$

Substitution then gives that

$$\int \big(x^5 ? x^2\big)\sqrt[3]{x^6 ? 2x^3}\,dx ? \frac{1}{6}\int \sqrt[3]{u}\,du$$

$$? \left(\frac{1}{6}\right)\left(\frac{3}{4}\right)u^{\frac{4}{3}} ? C ? \frac{1}{8}\big(x^6 ? 2x^3\big)^{\frac{4}{3}} ? C.$$

Solution 2: First, using the substitution
$u ? x^3 ? 2$, $\int x^2 \sqrt[3]{x^3 ? 2}\,dx$

$$? \frac{1}{3}\int \sqrt[3]{u}\,du ? \frac{1}{4}\big(x^3 ? 2\big)^{\frac{4}{3}} ? C.$$

Let $A ? \int x^6 \sqrt[3]{x^3 ? 2}\,dx$ and

$B ? \int x^3 \sqrt[3]{x^3 ? 2}\,dx$

Observe that $A ? \int x^4 \big(x^2 \sqrt[3]{x^3 ? 2}\big)dx$,

so we can do integration by parts on this integral with

$u ? x^4, du ? 4x^3\,dx, dv ? \big(x^2 \sqrt[3]{x^3 ? 2}\big)dx$, and

$$v ? \frac{1}{4}\big(x^3 ? 2\big)^{\frac{4}{3}}.$$

Then $A ? B ? \frac{1}{4}x^4 \big(x^3 ? 2\big)^{\frac{4}{3}} ? A ? 2B ? B.$

Thus $2?A ? B?? \frac{1}{4}x^4 \big(x^3 ? 2\big)^{\frac{4}{3}}$, and

$$\int x^6 ? x^3 \sqrt[3]{x^3 ? 2}\,dx ? A ? B$$

$$? \frac{1}{8}x^4 \big(x^3 ? 2\big)^{\frac{4}{3}} ? C ? \frac{1}{8}x^4 \big(x^6 ? 2x^3\big)^{\frac{4}{3}} ? C.$$

Senior Math Banquet

This year's math banquet for graduating seniors will be held Thursday, May 12th at 6pm in the King's Room. If you would like to attend, please send your caf ID number to Donna Brakke (brakke@stolaf.edu) by Friday, May 6th.

Come help plan the spring picnic!

MSCS students of all years are invited to join us on Monday evening to plan this year's exciting spring picnic, scheduled for Sunday, May 15th! This is a fun event for both students and faculty, usually involving a faculty/student softball game, and sometimes involving a roasted animal of some type. Come have your say and join the team to make it all happen. We'll meet in SC188 at 9:00pm, and will be serving twizzlers to help with the brainstorming. Questions? Contact Professor Crowley at crowley@stolaf.edu.

***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.