Goodsell Gazette

Carleton College *November 5, 2021*
Northfield, MN 55057 *The newsletter for the Carleton mathematics and statistics community* *Vol. 40, No. 5*

Crafts and Conversations: Last of the Year!

GeMMS is hosting a conversation with Kayla Wright. Kayla is a current PhD candidate at the University of Minnesota, and has been teaching Calc 111 here at Carleton this term! She is the President of the Women in Math chapter at the U of M, and a MathCamp mentor. We'll be talking about her experiences in mathematics and graduate school in a casual conversation, and making friendship bracelets as our craft (additional craft supplies will be available)!

When: Wednesday, Nov 10, 6pm
Where: CMC 209
What: Conversation and Crafts!

This event is targeted at gender minorities in math and statistics.

GeMMS Study Break

When: 3pm, the Saturday of Reading Days (Nov 20)

Where: CMC 206

What: Games, talking to like-minded math and stats enthusiasts, and snacks - there will be hot chocolate, lemonade, brownie bites, and fruit. Come relax and fuel up for exams - and bring your friends!

This event is open to everyone.

Upcoming Events

Week 9

Wednesday November 10, 6:00 - 7:00pm
Crafts and Conversations — CMC 209

Week 10

Saturday November 20, 3:00 - 4:00pm
GeMMS Study Break — CMC 206

Job, Internship, & Other Opportunities

dQ&A Market Research Inc - Quantitative Analyst

dQ&A is a research company committed to making life better for people living with diabetes. The Qualitative Analyst will support the three members of the qualitative research team. If you are more of a words person than a numbers person, then you may enjoy qualitative research, as we are all about figuring out the reasons why people behave the way they do.

Find more information and apply at carleton.joinhandshake.com/jobs/5539505.

Close Concerns - 2022 Associate

Close Concerns, a healthcare information company that advocates for people with diabetes, seeks undergraduate applicants for its two-year Associate Program, based in San Francisco. The Associate Program gives new college graduates unparalleled exposure to the 'real world' of healthcare and business, significant work experience and responsibility, international travel, and built-in support for graduate school applications.

View full description and apply at carleton.joinhandshake.com/jobs/5539406.

Southern Teachers Agency

The Southern Teachers Agency works with private and independent schools to find qualified teachers. Apply at southernteachers.com/new-candidate.

Problems of the Fortnight

To be acknowledged in the next *Gazette*, solutions to the problems below should reach me by noon on Tuesday, November 16.

1. Consider an $m \times n$ rectangle, divided into mn unit squares by line segments parallel to the sides. As a function of m and n, how many dots can be put inside this rectangle so that:

   a) The dots are at the centers of some of the unit squares *and*
   b) No two unit squares that are adjacent horizontally, vertically, or diagonally both contain dots?

(If you know the rules of chess and you think of the rectangle as a "chessboard", you'll see that the problem is asking for the largest number of kings that can be put on the board so that no two of the kings attack each other. For example, a little experimentation should convince you that the answer is 1 for $m = n = 2$ and 4 for $m = n = 3$.)

As usual, a solution should provide not only the answer but also a justification that the answer is correct, in particular, that it is impossible to place more dots (or kings) under the given conditions.

2. Let i, j, m, n be integers. Then for any nonzero rational numbers x and y, $x^i y^j$ and $x^m y^n$ will also be rational numbers, but the converse may not be true: $x^i y^j$ and $x^m y^n$ might both be rational numbers even though x and/or y is/are not rational. (For example, if $i = 1, j = -3, m = 5, n = 7$, and $x = y = \sqrt{2}$, then $x^i y^j = 1/2$ and $x^m y^n = 64$ are both rational, but x is not rational.) Find a necessary and sufficient condition on i, j, m, n for the converse to be true, so that when i, j, m, n satisfy the condition and $x^i y^j$ and $x^m y^n$ are both rational, it follows that the (nonzero) numbers x and y are both rational, whereas if i, j, m, n don't satisfy the condition, there is an example of nonzero x and y which are not both rational but for which $x^i y^j$ and $x^m y^n$ are both rational.

It's a pleasure to report that, between them and sometimes working in various combinations that I won't untangle here, John Byun, Sebastian Vander Ploeg Fallon and Erin Watson solved both problems posed October 22; each of them (the students, not the problems) can consult with Sue Jandro to get an item from the B.B.O.P. - to which, incidentally, a number of books were recently added. The first problem was also solved by "Auplume". Nice going, all; good luck on the new problems above!

- Mark Krusemeyer

Editors: ***Owen Biesel, Antonia Ritter***

Problems of the Fortnight: ***Mark Krusemeyer***

Web & Subscriptions: ***Sue Jandro***