Math News
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Electrical Engineering

The circuit breaker box problem from November can be solved in just seven trips if you engineer your solution as follows. Using a strip of masking tape on each breaker, mark half of them with a 1 and the other half with a 0, turning on the 1s and turning off the 0s. Go find which fifty lights are on and mark them (more tape) with a 1; find which fifty lights are off and mark them with a 0. Return a second time to the box. Turn half the 1s off marking them as 10s; leave on the other half of the 1s on marking them as 11s. Similarly divide the 0s into half 00s and half 01s. Climb the stairs to add a 1 to the label for the lights on and add a 0 for those off. On your next trip down, half of each of the four existing groups will be have to be 12 or 13, with no problem. Continue dividing each group in half.

As you can see, this binary algorithm effectively assigns a unique base 2 number to each of the 100 breakers and a unique base 2 number to each light, and they will match! Since 2^7 > 100, an eighth trip will be unnecessary. Don't forget to bring up a soda from the basement fridge.

A Growing Problem

When Johann was six years old, he hammered a nail into his favorite tree to mark how tall he was. Ten years later at age sixteen, Johann returned to see how much higher the nail was. If the tree grew by twelve centimeters each year, how much higher would the nail be? [HINT: This problem is more about assumptions than it is about calculations.]

Scholarship Info

Students eligible for any scholarships, including MATH awards, should complete the online application process at https://frostburg.academicworks.com/ by March 1st.

Fall 2022 Course Offerings

See your advisor by early April to register for any course.

236.001	Bubp	MTThF	11:00-11:50
236.002	Dunmyre	MTThF	2:00- 2:50
236.003	Dunmyre	MF 10:00-10:50 + TTh 9:30-10:20	
237.001	Horacek	MTThF	2:00- 2:50
238.001	Barnet	MTThF	2:00- 2:50
280.001	Hegde	M W F	1:00- 1:50
315.001	Bubp	T Th	3:30- 4:45
425.001	Barnet	T Th	2:00- 3:15
432.001	Barnet	M W F	12:00-12:50
451.001	Horacek	T Th	3:30- 4:45
491.001	Hughes	M W	3:00- 4:15

Career and Internship Fairs Scheduled

Virtual– March 9th – 11 – 2. On-Campus– April 20th – 11 – 2.

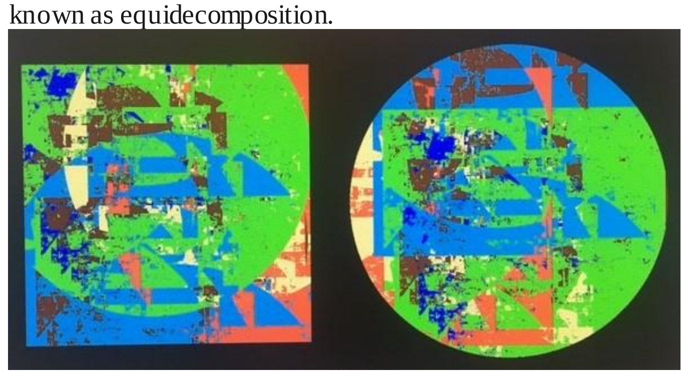
KME Corner

KME will next meet on Thursday, February 24th, from 6:30 until 7:30 in CCIT 223. The meeting is open to anyone interested in learning more about KME. In addition to enjoying puzzles and pizza, attendees will discuss the upcoming ceremony to induct new members, participation in an online regional convention, and the annual Pi Day bake sale.

Speaking of Corners

Around 450 BC, Anaxagoras of Clazomenae posed a now-famous mathematics problem known as squaring the circle: Using a compass and a straightedge, can you produce a square of equal area to a given circle? This question was answered in 1882, when Ferdinand von Lindemann proved that pi (the area of a circle with radius 1) is transcendental. Because a previous result had demonstrated that it's impossible to use a compass and a straightedge to construct a length equal to a transcendental number, it's also impossible to square a circle that way.

That might have been the end of the story, but in 1925 Alfred Tarski revived the problem by tweaking the rules. He asked whether one could accomplish the task by chopping a circle into a finite number of pieces that could be moved within a plane and reassembled into a square of equal area — an approach known as equidecomposition.



A recent paper by Andras Máthé and Oleg Pikhurko of the University of Warwick and Jonathan Noel of the University of Victoria is the latest to address the topic. The authors show how a circle can be squared by cutting it into pieces that can be visualized and possibly drawn. One drawback (and therefore one avenue for potential improvement) is that they use about 10^200 pieces.

For more on the problem, including its relation to philosophy, mathematics history, ancient geometry, proofs by construction, existence proofs, fractals, probability, and graph theory, see https://www.quantamagazine.org/an-ancient-geometry-problem-falls-to-new-mathematical-techniques-20220208/.

Math News is published for students, faculty, staff, administrators, and retirees by the Department of Mathematics.