Mathematics Published Under a Pseudonym

Speaker:

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Have you every read any of the books written by:

Ellis Bell

Currer Bell

What about books by :

Charlotte Brontë

Emily Brontë

Actually Emily and Charlotte were sisters and they did not write under their own names - the used pseudonyms!

Have you read any books by Lewis Carroll?

What about C.L. Dodgson?

Actually Lewis Carroll and C.L. Dodgson (1832-1898) were the same person.

And he wrote:

Alice in Wonderland!!

Why in the 19th century did various people publish under a pseudonym?

The reason women published under a pseudonym is clear!

Women wanted to protect their reputation within their family and some publishers would not publish works by women, and some people would not purchase books by women.

There was little equal opportunity for women at that time. In particular many "jobs" were not open to women and women could not get a college/university education on an equal footing as men. The preeminent universities in Britain, Cambridge and Oxford did not admit women until quite recently.

Girton College first admitted women in 1869 but degrees were not awarded to women until 1948!

One reason University College in London was founded (1826), now part of the University of London, was to allow women to get an education and also allow Jews to get an education. One could STUDY mathematics at Cambridge or Oxford but to receive a degree one had to sign a statement that one adhered to the Church of England!

This was known as signing the articles.

The great British, Jewish mathematician James Joseph Sylvester **could not** get a degree or fellowship at Cambridge.

Regarding issues of equity Sylvester's family name was actually Joseph, but his older brother had changed the family name to Sylvester to "disguise" the religious background of the family and thereby hoped to avoid anti-semitism.

Ironically, based on his work at Cambridge, Trinity College in Dublin Ireland granted Sylvester a degree because they had more liberal attitudes towards Jews at the time.

Why did C.L. Dodgson write under a pseudonym?

He was a lecturer at Oxford and was nervous that people would consider it "demeaning" for a university mathematician to write something as "frivolous" as Alice in Wonderland!!

Today few know Dodgson for the important work he did as a pioneer of studying mathematical ways to understand elections and voting better.

Condorcet's method selects the person who can beat every other candidate in a two-way race, if there is such a person. If not, Dodgson's method is to select the person who needs the fewest candidate preference interchanges in the ballots to be the Condorcet winner. Elegant idea but computationally hard.

Blanche Descartes

Any associations with this name?

Perhaps some echo of René Descartes?

Who were the members of Blanche Descartes?

Perhaps listed in order of their "fame?"

William Tutte (1917-2020)

Every 4-connected plane graph has a hamiltonian circuit.

(Tutte worked at Bletchley Park with Alan Turing on breaking the Nazi enigma code.)
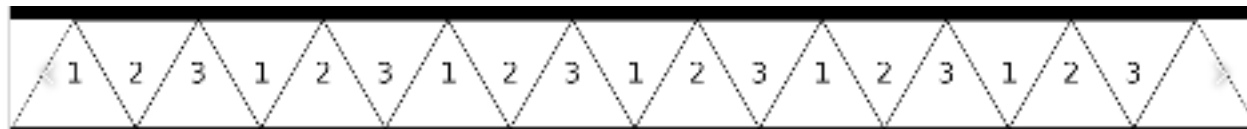
Roland Brooks (1916-1993)

Cedric Smith (1917-2002)

Arthur Stone (1916-2000) (his mathematician son, sadly no longer alive taught for many years at Brooklyn College (CUNY)

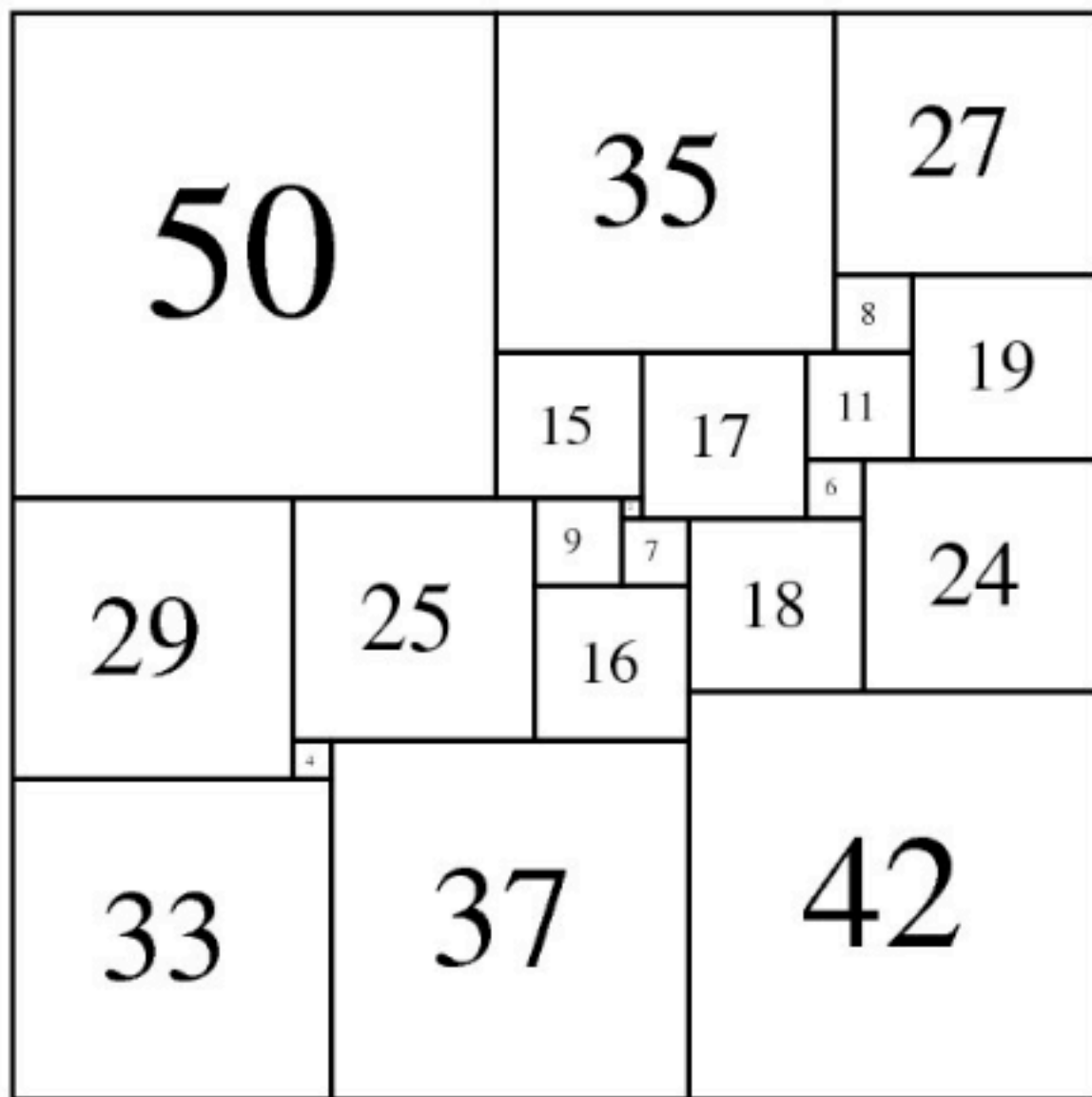Perhaps Stone is most famous for "inventing" flexagons:

# Hexaflexagons can be made from a strip of 19 triangles, suitably folded!

Given a rectangle (or more specifically a square) when can it be decomposed into other squares all of which have different side lengths!

This problem is surprisingly hard to study, even with the powerful computers now available.
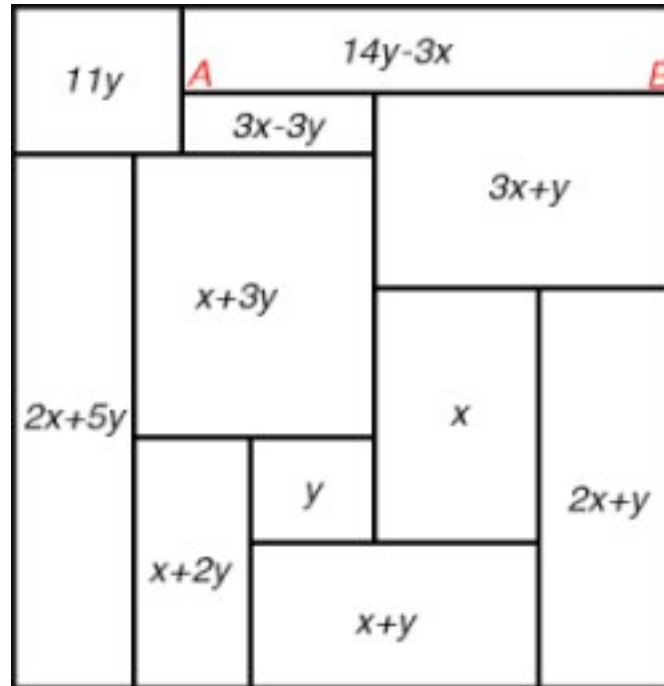
The problem has a surprisingly complicated history with connections to many people better known for other work.

A 33x32 squared rectangle whose discovery is related to the work of Blanche Descartes:
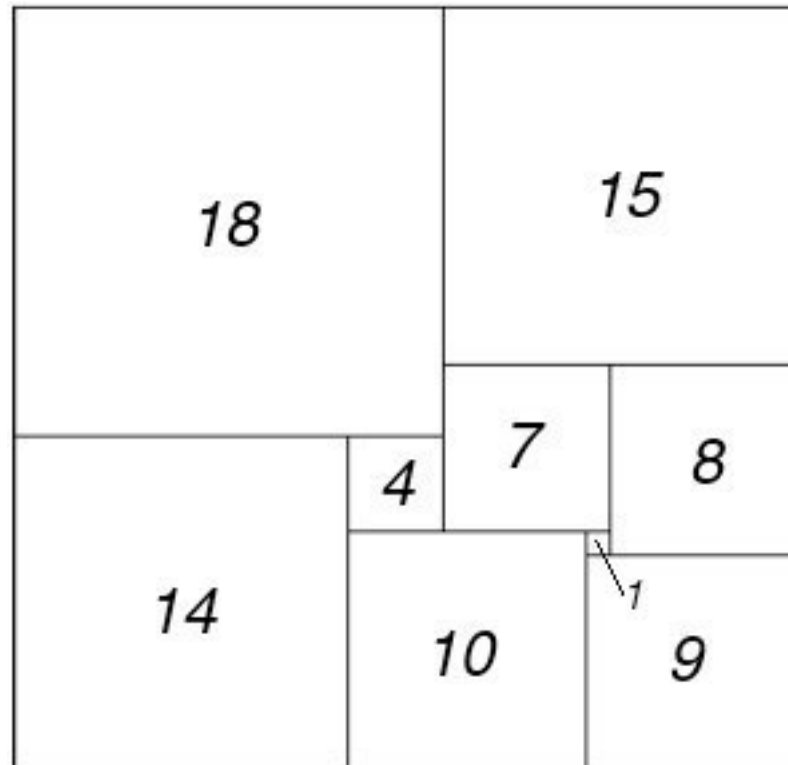
Algebraic approach:

For the example above to work we need to have

$$(3x + y) + (3x - 3y) = (14y - 3x)$$

$$16y = 9x$$

Which leads to a solution when x is 16 and y = 9 - giving a 177x176 rectangle!

Scheduling committees

There is a collection of committees but some of them have common members. What is the minimum number of time slots that the committees can be scheduled into so that there is no conflict.
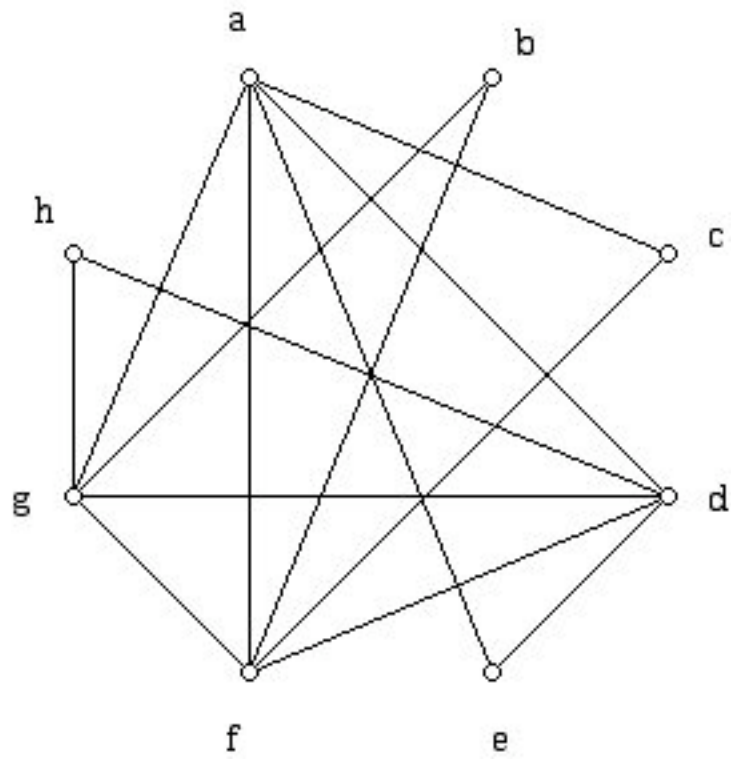
(Idea: Some committees can meet at the same time with no conflict.)

Committees a to h:

X means two committees have a common member and, thus, cannot meet at the same time.

	a	b	c	d	e	f	g	h
a			X	X	X	X	X	
b						X	X	
c	X					X		
d	X				X	X	X	X
e	X			X				
f	X	X	X	X			X	
g	X	X		X		X		X
h				X			X	

Information in the table above represented geometrically:
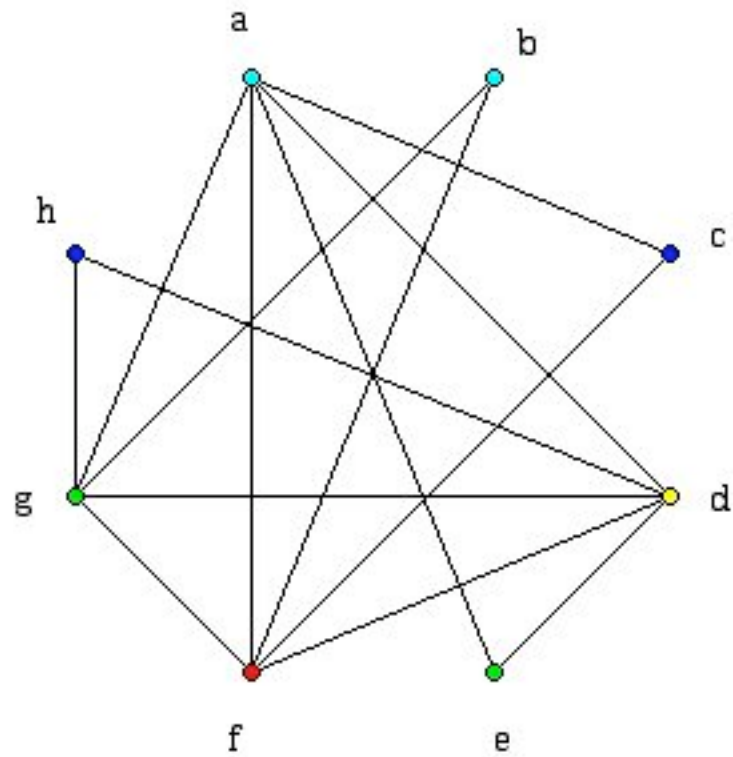
Two committees which have a common member are joined by an edge. Dots are called vertices or nodes. The line segments are called edges.

What is the minimum number of colors that are needed to color all the vertices so that no two vertices joined by an edge get the same color?

This is called the chromatic number number of the graph.

5-coloring

Challenge: Can you color the prior graph with 4 colors?

Answer:

It can be done, and 4 is the best possible.

Brooks's Theorem:

If G is not a complete graph (every vertex joined to every other) or an odd-length circuit, the vertex coloring number of G is less than or equal to the largest number of edges at any vertex (the degree or valence of the vertex).

Cedric Smith (1917-2002)

Theorem: Every 3-valent cubic graph has a even number of circuits that pass through each vertex once and only once (Hamiltonian circuit)
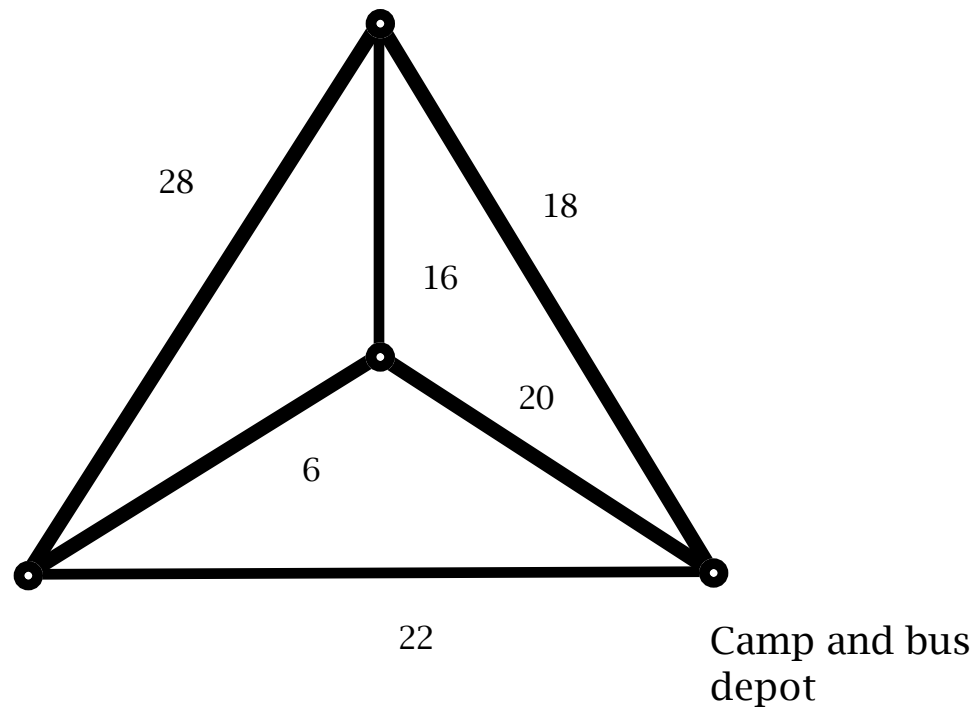
Because this graph has one
Hamilton circuit tour,
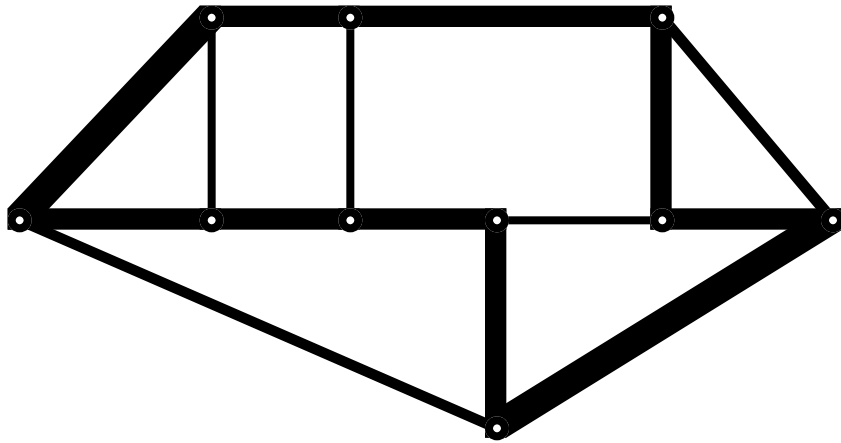
by Smith's Theorem it must have
another!

Traveling Salesperson Problem:

Given a graph with weights on the edges, find a simple circuit tour (hamilton circuit) which has smallest cost (distance, time):

28

18

16

20

6

22

Camp and bus depot

G. W. Peck

Any association with this name?

Perhaps with the actor whose first name did not actually begin with a G!

Eldred Gregory Peck (April 5, 1916 – June 12, 2003)

(starred in To Kill a Mocking Bird)

Who makes up the "group" G. W. Peck?

Ron Graham (1935-2020) (who died earlier this year) (Fan Chung was his wife)

He is known primarily for his work in number theory. But also did significant work related to machine scheduling.

Douglas West (1953-   )

Author of a popular book about graph theory. Most of his work is in the area of discrete mathematics.

George Purdy (1944-2017)

Known for his work in discrete geometry.

Paul Erdös (1913-1996)

This Hungarian born citizen of the world spent much of his life traveling the world promoting easy to state problems that fostered leaps in mathematical tools and domains. Many of these problems were in number theory, discrete geometry, and combinatorics.
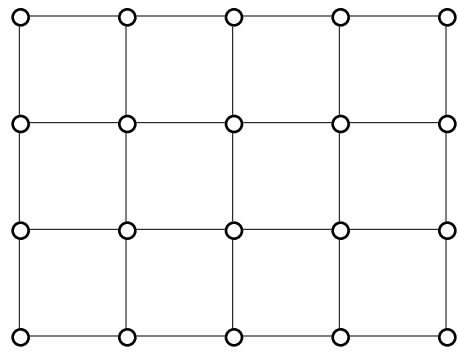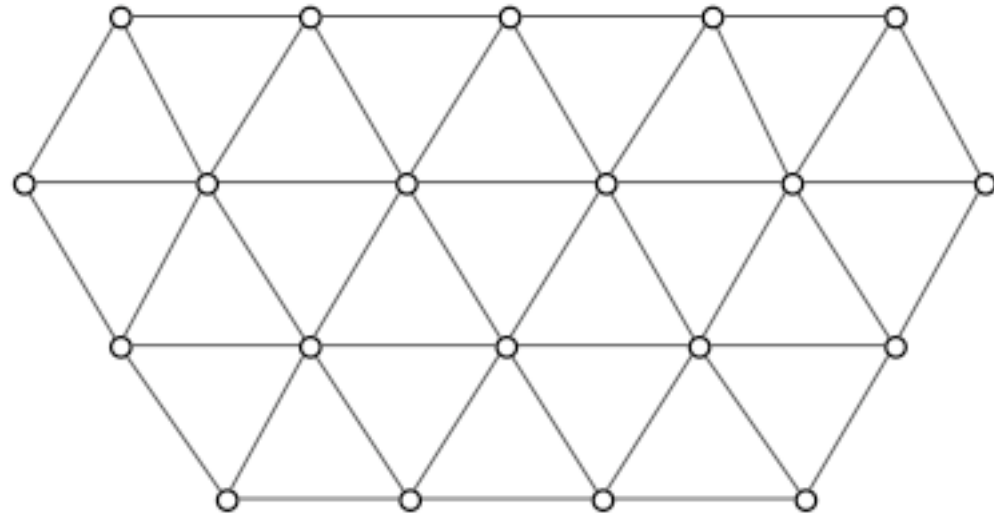
Sample problem:

Given a finite number of points in the plane, study the number of distinct distances (or integer distances) that the point set can determine.

The point set (graphs) below each have 20 vertices:

a. Polyiamond - equilateral triangles

b. Polyomino - squares

Activity: Which has more distinct distances?

Fan Chung (1949 -) (Ron Graham's wife)

Daniel Kleitman (1934-   )

Doug West is a doctoral student of Kleitman, who wrote his doctoral thesis in mathematical physics (with Julian Schwinger - known as a physicist) but most of his work is in combinatorics (partially ordered sets).

You should attach your real name to all of the new elementary patterns that you might discover as part of your work in mathematics and CS!

Thanks for your attention!

Questions? Comments?