Oceania

MathsJam Jam

Songbook

2021

Contents

George Boole

George Boole, don't be so sad
You took an idea and made it better:
A statement that's either true or false
Can be represented as a letter

George Boole, don't be afraid
You are remembered for your al-ge-bra
You thought everything was just black or white
Where they saw a horse you saw a zebra

And anytime you feel the pain,
George Boole, refrain
You carry the world upon your numbers
You made a most fantastic tool
George Boole, it's cool
For making computers unencumbered
Nah, nah nah, nah nah, nah nah, nah nah

George Boole, don't be down
You're regarded as a pacesetter
When switching circuits were first invented
There was no other theory better

So using one or using nought,
George Boole, you taught
Us operations like conjunctions,
Though electronics came after you,
George Boole, you knew
We had what we needed for its construction
Nah, nah nah, nah nah, nah nah, nah nah yeah

George Boole, don't be afraid
You are remembered for your al-ge-bra
You thought that everything was just black or white
Where they saw a horse you saw a zebra, zebra, zebra, zebra, zebra, yeah!
Nah, nah nah, nah nah, nah, nah, nah nah, George Boole (repeat 8 times!)

Write in C

When I find my code in tons of trouble,
Friends and colleagues come to me,
Speaking words of wisdom:
"Write in C."

As the deadline fast approaches,
And bugs are all that I can see,
Somewhere, someone whispers:
"Write in C."

Write in C, write in C,
Write in C, oh, write in C.
LISP is dead and buried,
Write in C.

I used to write a lot of FORTRAN,
For science it worked flawlessly.
Try using it for graphics!
Write in C.

If you've just spent nearly 30 hours
Debugging some assembly,
Soon you will be glad to
Write in C.

Write in C, write in C,
Write in C, yeah, write in C.
Only wimps use BASIC.
Write in C.

Write in C, write in C,
Write in C, oh, write in C.
Pascal won't quite cut it.
Write in C.

For Cosine, Tan and Sine

Lyrics by Alison Kiddle 2018
*To the tune of **Auld Lang Syne***

Should SOHCAHTOA be forgot
When trig is brought to mind?
The unit circle is your friend
For cosine, tan and sine.

For cosine, tan and sine, my dear,
For cosine, tan and sine,
The unit circle helps you out
With cosine, tan and sine.

And surely x gives you the cos
And y gives you the sine,
The tangent is the gradient
Of th'hypotenuse incline.

For cosine, tan and sine, my dear,
For cosine, tan and sine,
The unit circle helps you out
With cosine, tan and sine.

And there's a hand my trusty friend
To work out the length of lines
In each right-angled triangle
With cosine, tan and sine.

For cosine, tan and sine, my dear,
For cosine, tan and sine,
The unit circle helps you out
With cosine, tan and sine.

What shall we do with the function, Taylor?

Lyrics by Martin Harris 2018
To the tune of **The Drunken Sailor**

What shall we do with the function, Taylor?
What shall we do with the function, Taylor?
What shall we do with the function, Taylor?
Early in the MathsJam

Refrain:
> *Maintain derivatives*
> *Maintain derivatives*
> *Maintain derivatives*
> *Early in the MathsJam*

Sum for n from zero to infinity
Sum for n from zero to infinity
Sum for n from zero to infinity
Early in the MathsJam

Refrain

Differentiate to the nth degree
Differentiate to the nth degree
Differentiate to the nth degree
Early in the MathsJam

Refrain

Multiply by (x minus a) to the n
Multiply by (x minus a) to the n
Multiply by (x minus a) to the n
Early in the MathsJam

Refrain

Finally divide by n-factorial
Finally divide by n-factorial
Finally divide by n-factorial
Early in the MathsJam

Refrain

Millennium Prize Song

What line are the zeros on?
Of the Zeta Function
What line are the zeros on?
This no one knows
What line are the zeros on?
Riemann predicted every one.
When will we ever learn? When will we ever learn?

Is P = NP wrong?
This is quite a tricky one
Is P = NP wrong?
This no one knows
Is P = NP wrong?
Solve this for a million
And maybe a Nobel gong … maybe a Nobel gong.

How does all the fluid flow?
Smooth or Turbulent there it goes
How does all the fluid flow?
This no one knows
Solve the equations of Navier-Stokes
And publish it to all math folks
It'll earn you lots of dough. It'll earn you lots of dough.

Now we come to Poincairé.
For this we can shout Hooray
Now we come to Poincairé
Now this we know
Now we come to Poincairé
Perlmann put this one away
But he didn't want the prize. He didn't want the prize.

Three more problems we'll forget
From the famed Millennium septet
This ballad is to too short to tell
And they don't scan too well
But if you want each one to know
Ask Ross and he will show
It all in 5 minutes or less … it in 5 minutes or less

Sin on Cos Can Turn into Tan

Lyrics by Colin Beveridge 2016
To the tune of **Santa Claus is Coming to Town**

You'd better swot up, it's hard to get by
Unless you know the graphs from 0 to 2π,
Sin on cos can turn into tan.

You're squaring sin x, squaring the cos,
You're going to get one whatever x was,
Sin on cos can turn into tan.

You even know the hard ones,
you barely have to check
You know that 1 + tan squared x
becomes the square of sec!

You've drawn it all out, it's easy to see,
Cos pi by six is half of root 3
Sin on cos can turn into tan.

You've picked up all the formulas,
you've read them through and through
The area of a sector
is r-squared theta over two

You used to hate radians, now it's your strength
Since you learned that r theta gives the arc-length
Sin on cos can turn into tan.

Your teacher's in a Santa hat,
you swear that you don't know her
Because there's really no excuse
for ho-ho-hoh-cah-toa.

You'd better swot up, it's hard to get by
Unless you know the graphs from 0 to 2π,
Sin on cos can turn into tan.
Sin on cos can turn into tan.

Triangle was his name-o

There was an angle had a name
And Righty was his name-o
Square corner just like so,
Square corner just like so,
Square corner just like so
And Righty was his name-o

There was an angle had a name
And Acute was his name-o
Closed like a v just like so,
Closed like a v just like so,
Closed like a v just like so
And Acute was his name-o

There was an angle had a name
And Obtuse was his name-o
Open wide just like so,
Open wide just like so,
Open wide just like so
And Obtuse was his name-o!

I Fill in my Census

I fill in my census
by ticking checkboxes,
by writing in numbers
in the space on the form.
Once every five years
StatsNZ comes knocking.
We fill in our census
to learn about us

Come statisticians,
let me give my life to you.
Let me give you my data,
my birthday, my name,
my workplace, my dwelling
my fam'ly and income,
let every household
come tell you again.

Let us count every person.
Our population
is growing again!

I fill in my census
by clicking the options
and typing the answers
on a digital form.
Ev'ry demographic
that makes up New Zealand
fills out the census:
our national survey.

Finite Simple Group (of Order Two)

Lyrics by The Klein Four 2005
YouTube link: https://www.youtube.com/watch?v=UTby_e4-Rhg

The path of love is never smooth
But mine's continuous for you
You're the upper bound in the chains of my heart
You're my Axiom of Choice, you know it's true

But lately our relation's not so well-defined
And I just can't function without you
I'll prove my proposition and I'm sure you'll find
We're a finite simple group of order two

I'm losing my identity
I'm getting tensor every day
And without loss of generality
I will assume that you feel the same way

Since every time I see you, you just quotient out
The faithful image that I map into
But when we're one-to-one you'll see what I'm about
'Cause we're a finite simple group of order two

Our equivalence was stable,
A principal love bundle sitting deep inside
But then you drove a wedge between our two-forms
Now everything is so complexified

When we first met, we simply connected
My heart was open but too dense
Our system was already directed
To have a finite limit, in some sense

I'm living in the kernel of a rank-one map
From my domain, its image looks so blue,
'Cause all I see are zeroes, it's a cruel trap
But we're a finite simple group of order two

I'm not the smoothest operator in my class,
But we're a mirror pair, me and you,
So let's apply forgetful functors to the past
And be a finite simple group, a finite simple group,
Let's be a finite simple group of order two   (why not three?)

I've proved my proposition now, as you can see,
So let's both be associative and free
And by corollary, this shows you and I to be
Purely inseparable. Q. E. D.

Mathematical Pi

Lyrics by Antoni Chan and Ken Ferrier
To the tune of **American Pie** youtu.be/_BwKZEp2K_0

A long, long time ago,
long before the Super Bowl and things like lemonade.
The Hellenic Republic was full of smarts,
and a question resting on the Grecian hearts was;
"What is the circumference of a circle?"

But they were set on rational numbers,
and it ranks among their biggest blunders.
They worked on it for years,
and confirmed one of their biggest fears.
I can't be certain if they cried when irrationality was realised,
but something deep within them died
the day they discovered pi.

They were pondering;

Pi, pi, mathematical pi,
Three point one four one five nine, two
six five, three five, eight nine seven,
nine-three-two-three-eight-four six two,
six-four-three-three-eight-three-two seven   (not rounded).

Now I feel that I should mention
pi is applicable in any dimension,
at least as far as I know.
If there were no pi we'd be missing things,
like marbles and mugs and balls of string,
and sports, such as soccer and curling...

The orbs in their celestial paths
navigate along elliptical graphs.
Ellipses have pi in them too,
just one side of them has grew.
You can see pi in most everything;
it's in Cornell's Electron Storage Ring,
and also in slinkies and other springs,
and that's why it's important to know pi.

You should memorize,

Pi, pi, mathematical pi,
3.14 159 2,
65 35 897,
932384 62,
6433832 7

Once one night I had a dream
that pi was gone and I had to scream,
'cause all pi things had disappeared.
Can you imagine a world like that?
Circles aren't round and spheres are flat,
it's the culmination of everything we've feared.

'Twas a nightmare of epic proportions,
one that gave me brain contortions.
Oh wait! I mean contusions,
they put me in some institutions,
but then I escaped and now I'm free!

To sing of the virtue of pi!

Pi, pi, mathematical pi,
3.14 159 2,
65 35 897,
932384 62,
6433832 7

I Will Derive!

At first I was afraid, what could the answer be?
It said given this position find velocity.
So I tried to work it out, but I knew that I was wrong.
I struggled; I cried, "A problem shouldn't take this long!"
I tried to think, control my nerve.
It's evident that speed's tangential to that time-position curve.
This problem would be mine if I just knew that tangent line.
But what to do? Show me a sign!

So I thought back to Calculus.
Way back to Newton and to Leibniz,
And to problems just like this.
And just like that when I had given up all hope,
I said nope, there's just one way to find that slope.
And so now I, I will derive.
Find the derivative of x position with respect to time.
It's as easy as can be, just have to take dx/dt.
I will derive, I will derive. Hey, hey!

And then I went ahead to the second part.
But as I looked at it I wasn't sure quite how to start.
It was asking for the time at which velocity
Was at a maximum, and I was thinking "Woe is me."
But then I thought, this much I know.
I've gotta find acceleration, set it equal to zero.
Now if I only knew what the function was for a.
I guess I'm gonna have to solve for it someway.

So I thought back to Calculus.
Way back to Newton and to Leibniz,
And to problems just like this.
And just like that when I had given up all hope,
I said nope, there's just one way to find that slope.
And so now I, I will derive.
Find the derivative of velocity with respect to time.
It's as easy as can be, just have to take dv/dt.
I will derive, I will derive.

So I thought back to Calculus.
Way back to Newton and to Leibniz,
And to problems just like this.
And just like that when I had given up all hope,
I said nope, there's just one way to find that slope.
And so now I, I will derive.
Find the derivative of x position with respect to time.
It's as easy as can be, just have to take dx/dt.
I will derive, I will derive, I will derive!