The MathsJamJam Songbook 2017

Ada, Ada

Lyrics by Sue de Pomerai 2017
To the tune of Bicycle Made for Two

Ada, Ada translate this stuff for me
Menabrea wrote it in Italy
In England they are so critical
Of my engine Analytical
So please have a bash
Then I might get some cash
From the rich aristocracy

Babbage, Babbage the methods are hard to see
I've written some explanation in notes labelled A to G
Your Bernoulli sums are wrong
And really far too long (so)
I've added a table
With loops, so it's is able
To solve it efficiently

Argand

Lyrics by Sam Hartburn 2017
To the tune of Roxanne by the Police

Argand
You don't have to stick to the real line
Those days are over
Now imaginary is just fine
Argand
You can plot a + bi
Walk the complex plane
You don't care if the real part is too high

Argand…
You don't have to stick to the real line
Argand…
You don't have to stick to the real line

Argand… stick to the real line (x5)

Complex multiplication
You'll see as a rotation
Multiply by minus i
And you'll go 90 degrees clockwise
To calculate the modulus
We turn towards Pythagoras
Square both parts and take the square root
To find the size

Argand…
You don't have to stick to the real line
Argand…
You don't have to stick to the real line

Argand… stick to the real line (repeat to fade)

Benoit (or Starry Eyed Insight)

lyrics by Phil Chaffé and Ben Sparks
To the tune of 'Vincent' by Don McLean

Starry eyed insight,
Patterns on the complex plane,
Repeating cardioid domains,
With coloured points that show divergency.

Strange geometries,
Seahorse tails and fractal trees,
Dragon valleys, galaxies,
Combine in Benoit's iterative land.

And now I understand,
What you tried to show to me,
Infinite self-similarity,
Painted mathematically,
Some did not see it, they did not know how,
Perhaps they'll see it now.

Dazzling insight,
Recursive island satellites,
The nautilus and fine dendrites,
Reflecting patterns seen in earlier views.

Colors changing hue,
The spiral and the scepter chain,
Magnified appear again,
Repeating through the patterns strange and grand.

And now I understand,
What you tried to show to me
Infinite self-similarity,
Painted mathematically,
Some did not see it, they did not know how,
Perhaps they'll see it now.

For they could not see through,
Cherished fears held from their youth,
And find the beauty in the light,
Of mathematical insight,
They turned away as many often do;
But you could have shown them, Benoit,

The art in mathematics, that is beautiful and true.

Wonderful insight,
Found in natural displays,
Lightning strikes and fires blaze,
A mathematician sees and can't forget,

Like this strange Mandelbrot set,
The ragged coastline’s ragged shore,
When magnified repeats once more,
The fractals of our world put on their show.

And now I think I know,
What you tried to show to me,
Intricate self-similarity,
Beauty described mathematically,
Some could not see it, they can’t see it still,
Perhaps they never will.

Blackboard Wizard (We all know one…)

Lyrics by Phil Chaffé 2017
To the tune of Pinball Wizard by the Who

Ever since he was a young boy, He's heard mathematics' call
From Durham down to Oxford, He must have taught them all
I ain't seen nothing like him, In any lecture hall
That cool old maths professor
Sure plays a mean black board!

He stands just like a statue, Considering the scene
Then he starts to scribe away, Fueled by pure caffeine,
He'll always be respected,Universally adored,
That cool old maths professor
Sure plays a mean black board!

He's a black board wizard, There has to be a twist
A black board wizard, S'got such a supple wrist

How do you think he does it? I don't know!
What makes him so good?

At his age his hearing falters, His eyes have gone as well
But that won't even stop him, He writes by sense of smell
Always knows the theorems, Never seen him floored
That crazy maths professor
Sure plays a mean black board

I thought I was, The chalk and talk king
But I just handed, My board rubber to him

Even in my favorite classroom, He can beat my best
His speed of calculation, Leaves everyone impressed
He's got crazy flip-up chalksticks, He should win some award
That old maths professor, Sure plays a mean black board!

C.O.N.G.R.U.E.N.C.E.

Lyrics by Phil Chaffé 2017
To the tune of L.I.F.E.G.O.E.S.O.N. by Noah and the Whale

Tommy is a triangle who's searching for amour
Hoping for some romance
with the triangle next door
She's got acute angles and a common side

He met her at a nightclub
that was called the "Pi by 2"
Compared two of their sides lengths
and included angle too
Found invariance in their properties (proper – tyes)
(*ahem*)

From the hard time living to the end of the ride
They would always be connected by side-angle-side

He said, "C.O.N.G.R.U.E.N.C.E.
We've got so much in common between you and me
All our sides and our angles are the same"

"C.O.N.G.R.U.E.N.C.E.
Your orientation don't matter to me
All our sides and our angles are the same"

Some triangles find
that they're unlucky in the chase
And Joey was a triangle
that goes to prove this case
He thought he'd found
his triangle queen

Compared two of their side lengths,
they turned out identical
They even shared an angle
but she still seemed skeptical
Because it turned out
it wasn't in between

You found out Joey she's a different class
And in looking for a match you shouldn't be an ASS

She said, "C.O.N.G.R.U.E.N.C.E.

Just ain’t gonna happen between you and me
You're third side and two angles aren’t the same"

"C.O.N.G.R.U.E.N.C.E.
No transformation’s gonna get you to me
You're third side and two angles aren’t the same"

From side-angle-side, to all sides the same
All triangles find they’re part of this game
Hypotenuse-leg, two angles one side
Complete the list of conditions required

For

"C.O.N.G.R.U.E.N.C.E.
Can be transformed by an isometry
All your sides and your angles are the same"

"C.O.N.G.R.U.E.N.C.E.
Your orientation don’t matter to me
All your sides and your angles are the same"

"C.O.N.G.R.U.E.N.C.E.
Shows much more than mere similarity
All your sides and your angles are the same"

Ever Tried to Divide (By Something You Shouldn't've)

Lyrics by Sam Hartburn 2017
To the tune of Ever Fallen in Love (With Someone you Shouldn't've) by The Buzzcocks

It looked like a simple division
One term on top and a few terms
Down below
I did some simplification
The denominator cancelled
To zero

Ever tried to divide by something, Ever tried to divide, divide by something
Ever tried to divide, divide by something, You shouldn't've tried to divide by

I tried it on a calculator
The display said syntax error
What a shame
I tried it in a spreadsheet
I got # div by zero
What a pain

Ever tried to divide by something, Ever tried to divide, divide by something
Ever tried to divide, divide by something, You shouldn't've tried to divide by

I can't carry on much longer
The situation's getting
Worse and worse
If I try to divide by zero
I run the risk of splitting the
Universe

Ever tried to divide by something, Ever tried to divide, divide by something
Ever tried to divide, divide by something, You shouldn't've tried to divide by

Ever tried to divide by something, Ever tried to divide, divide by something
Ever tried to divide, divide by something, You shouldn't've tried to divide by

Have tried to divide by
Ever tried to divide by something you shouldn't've tried to divide by

Free Fallin’ (Complete with Southern Drawl)

Lyrics by Phil Chaffé 2017
To the tune of Free Fallin’ by Tom Petty

I’m a point mass in a high school problem
No dimensions to call my own
I’m a point mass modelling a baseball
An’ I’m movin’ ‘cos I’ve just been thrown

Air resistance ain’t gonna affect me
You can find my range an’ trajectory
From components of my initial veloc’ty
Considered vertical and horizont’ly

‘cos I'm free, free fallin'
Yeah I'm free, free fallin'

Got no truck with that gen’ral relativ’ty
(‘cos) space-time curv’ture can really be a pain
I’m gonna move with uniform accel’ration
I’m happy in my Newtonian domain

And I'm free, free fallin'
Yeah I'm free, free fallin'

Free fallin', now I'm free fallin'
Now I'm,
Free fallin', now I'm free fallin'

I’m gonna move in a perfect parab’la
Gonna land at the same height s‘where I begun
Gonna keep my horizontal veloc’ty
Gonna change vertical from up to down

‘Cos I'm free, free fallin'
Yeah I'm free, free fallin'

Yeah I'm free, free fallin'
Oh! Free fallin'
Now I'm free
Oh!
Free fallin'

Fulsome Circle Blues

Lyrics by Tom Button 2017
To the tune of Folsom Prison Blues by Johnny Cash

When I hear that C's two pi R,
it drives me round the bend
I've never liked that ratio since I don't know when
I want a Fulsome Circle, and that's why I use tau
'Cause the value times the radius,
it goes all the way round

When I was just a baby, my Mama told me 'Son,
if you want a circle constant there is only one
So I shot a man in Math class,
just 'cause he used pi
when I see that three point one four
I hang my head and cry

I know there's some folks talkin' about an identity
It's the one that came from Euler
that they think is so pretty
But if you cease from using pi
it wouldn't mean it had gone
'Cause E to the I tau, is identical to one

And when you're using radians,
it's the easy way to learn
As the fraction you use of tau's
the same fraction of a turn

Yes I want a Fulsome Circle,
and tau is here to stay
And I'll let that Fulsome constant
blow my blues away

MC Escher

Lyrics by Phil Chaffé 2017
To the tune of Helter Skelter by the Beatles

When I get to the bottom I'm right back
at the top of the slide
Start again, round and round, this impossible ride
Till I get to the bottom and I start off again
Yeah yeah yeah hey

Will you, won't you give me perspective
I'm stuck in your world but it ain't no place to live
Billions of lizards stretching out before me
Tiling the floor from here to infinity

Now M C Escher, M C Escher
M C Escher yeah, Ooh!

Do you, don't you want it to make sense
I try to understand but you make me feel dense
Fish transforming into swans
It's all too much for my poor neurons

(Look out now) MC Escher, MC Escher
M C Escher yeah, Ooh!

Look out, cos here he comes

When I get to the bottom I'm right back at the top of the slide
Start again, round and round, this impossible ride
Till I get to the bottom and I start off again
Yeah yeah yeah

Well do you, don't you want to be obtuse
Ladders going sideways really ain't that much use
Living with you is the ultimate bad trip
I've been chased by ants around a Moebius strip

(Look out now) MC Escher, MC Escher
M C Escher
Now M C Escher, M C Escher
M C Escher yeah, Ooh!
(I got blisters on my brain cells!)

Millennium Prize Song

Lyrics by Derek Couzens 2017
To the tune of "Where have all the flowers gone?" by Peter, Paul and Mary

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 Colin and he will show
It all in 5 minutes or less … it in 5 minutes or less

The Signs They Need A-Changin'

Lyrics by Colin Beveridge 2017
To the tune of The Times They are A-Changin' by Bob Dylan

Come aficionados, no matter what sport
I've got a cause you can lend your support
The footballs on roadsigns don't look like they ought
The shape that they've got is a strange 'un
In terms of depiction it falls badly short
The signs they need a-changin'.

Come all you who question whether it's worth it
To fix all these signs that are slightly imperfect:
It looks like a pic of no football on earth, it
Distracts me, it's frankly endangerin'
We have to dispel this hexagonal surfeit
The signs they need a-changin'.

Come you who suppose that it's only a game
Just look at the signs in Brazil and in Spain
They get it right, and to add to our shame,
We're being trolled by an Australian
It's only in Malta they do it the same
The signs they need a changin'.

Come you in charge of all matters procedural
Surely it won't be that great an upheaval?
To make them truncatedly icosahedral
Instead of the current arrangement
You're fixing a sign, not a blinking cathedral
The signs they need a-changin'

Tan, cos and sine

Lyrics by Phil Chaffé 2017
To the tune of Sweet Caroline by Neil Diamond

Where it began
Astronomers looking up in The second millennium BC

And then it grew
Developed by Aryabhata (ary-ab-hata)
Now we call it trigonometry

Lines, touchin' lines, Triangles, right-angles, ratios

Tan, cos and sine (do, do, do)
Functions never seemed so good
Now I can find (do, do, do)
Lengths I never thought I could
But now I…

…look at the right
Angle there in the triangle, Opposite the hypotenuse

And when I know
One side length and an angle
I know which ratio to use
Lines, touchin' lines, Triangles, right-angles, ratios

Tan, cos and sine (do, do, do)
Functions never seemed so good
Now I can find (do, do, do)
Lengths I never thought I could
So it goes

Soh cah toe, soh cah toa (toa)
Soh cah toe, soh cah toa (toa)
Soh cah toe, soh cah toa, toa

Tan, cos and sine (do, do, do)
Functions never seemed so good
Tan, cos and sine (do, do, do)
Find lengths I never thought I could
Tan, cos and sine
Functions never seemed so good
Tan, cos and sine

Total Ellipse, Not a Half

Lyrics by Tom Button 2017
to the tune of Total Eclipse of the Heart by Bonnie Tyler

(Almost round) Its shape is like a circle but a little bit stretched as you look along the length of one side
(Almost round) I want to plot its curve so I will need an expression that will generate a function for Y
(Almost round) I can take X squared over A squared from B squared and then I just square root it all
(Almost round) I look at my graph, I'm a little bit horrified to see it hasn't plotted it all
(Almost round circle) Why do I get only the top half?
(Almost round circle) Why do I get only the top half?

And I need a negative Y, and I need it more than ever
And if I'm going to get this right, then I'll need to be quite clever
If I think what it's got to look like, para-metrically
If I can plot my curve using just cos and sine
It will give me the full curve and be just fine
With A Cos T for X and B sine T for Y
And T that goes from zero all the way to two pi
I've got my negative Y!, Yes, I can see my curve is right, I can see my curve …

Once upon a time I used a function for Y, but then it only drew the top part
With parametrics: I get a total ellipse, not a half
Once upon a time I used a function for Y but then it only drew the top part
With parametrics: I get a total ellipse, not a half

(Almost round) It's shape is the locus of points that are the same distance from foci
(Almost round) It's made when a cone is cut by a plane with slope less than the cone's lines
(Almost round) I want an equation that generates my curve on a set of X-Y axes
(Almost round) But if I use a function, I'm a little bit horrified there's a part of the curve I don't see
(Almost round circle) Why do I get only the top half?
(Almost round circle) Why do I get only the top half?

And I need a negative Y, and I need it more than ever
And if I'm going to get this right, then I'll need to be quite clever
If I think what it's got to look like, para-metrically
If I can plot my curve using just cos and sine
It will give me the full curve and be just fine
With A Cos T for X and B sine T for Y
And T that goes from zero all the way to two pi
I've got my negative Y!, Yes, I can see my curve is right, I can see my curve …

Once upon a time I used a function for Y, but then it only drew the top part
With parametrics: I get a total ellipse, not a half
Once upon a time I used a function for Y but then it only drew the top part
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Once upon a time I used a function for Y but then it only drew the top part
With parametrics: I get a total ellipse, not a half

Traversable

Lyrics by Phil Chaffé 2017
To the tune of Wonderwall by Oasis

Today is gonna be the day
That my postman job is gonna start
I've got a red sack and some shorts
You know I really look the part
I don't believe that anybody knows the shortest way
Around this town

My feet must walk on every street
And then end up where they started out
Some say they think it can't be done
But I've never really had a doubt
I don't believe that anybody knows the shortest way
Around this town

And all the nodes of odd degree need finding
And weights of trails for every pair combining
There are many sums from which
to choose an optimal
And repeat its arcs

'cos maybe
I'm gonna get around this baby
'cos after all
It's traversable

Today was gonna be the day
But my postman colleagues turfed me out
They hate my route inspection ways
And called me a graph theory lout
I don't believe that any of them
wants the shortest way
Around this town

And all the nodes of odd degree need finding
And weights of trails for every pair combining
There are many sums from which
to choose an optimal
And repeat its arcs

'cos maybe
I'm gonna get around this baby

‘cos after all
It’s traversable

‘said maybe
We’ll make this thing Eulerian baby
‘cos after all
it’s traversable

‘said maybe, we’ll make this thing Eulerian baby
we’ll make this thing Eulerian baby, we’ll make this thing Eulerian baby