The MathsJamJam Songbook 2018

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1, 1, 2, 3, Fibonacci

Lyrics by Martin Harris 2018
to the tune of 2, 4, 6, 8, motorway by Tom Robinson Band

There's a sequence by a guy named Fibonacci
Consecutive terms add up to the following term
He wrote about in Liber Abaci
And now it's a sequence mathematicians learn

- Chorus -
And it's 1, 1, 2, 3
Fibonacci
A and B are followed by A plus B
5, 8, thir-, teen
Know what I mean?
Continue this sequence indefinitely

They're the sums of shallow diagonals of Pascal's triangle
They're there in pine cones and pineapples as well
It's related to the equiangular spiral
Which looks like a galaxy or a nautilus shell

- Chorus -

On and on the sequence keep evolving
21, 34, 55, 89
One hundred and forty four is the next term
Keep on going right on the number line

- Chorus -

All About That Base

Lyrics by Lucy Rycroft-Smith 2018
To the tune of Meghan Trainor: All About That Bass

Because you know it's all about that base,
'Bout that base: exponentials
It's all 'bout that base, 'bout that base, it's essential
It's all 'bout that base, 'bout that base, not tangential
It's all 'bout that base, 'bout that base

Yeah, it's pretty clear, raising to the power two

But without the base
What are you supposed to do?
Cause I got that classroom that all the boys chase
Make all the right sense in all the right places

I see them teachers, talkin' bout imaginary numbers
We know that shit ain't real
C'mon now, make it stop
If you got powers powers, just raise 'em up
But don't forget to check the base, read
From the bottom to the top

Yeah, my mama she told me don't worry about the guys
She says get you a warm calculator to hold at night
But she also said make sure when you exponentiate
The first place to start is to look closely at the base

Because you know it's all about that base,
'Bout that base: exponentials
It's all 'bout that base, 'bout that base, it's essential
It's all 'bout that base, 'bout that base, not tangential
It's all 'bout that base, 'bout that base

I'm bringing distribution back
Conceptually then you will get the knack
So if you think about that
Then it will tell ya
A power to a power just then multiplies the powers

Yeah my mama she told me don't apply this across addition
She said try to think structurally like a proper mathematician
You know you can collect powers as long as the base is the same
But only if multiplied, keep your head in the game.

Because you know it's all about that base,
'Bout that base: exponentials
It's all 'bout that base, 'bout that base, it's essential
It's all 'bout that base, 'bout that base, not tangential
It's all 'bout that base, 'bout that base

Because you know it's all about that base,
'Bout that base: two pieces
It's all 'bout that base, 'bout that base, indices
It's all 'bout that base, 'bout that base, sweet Jesus
It's all 'bout that base, 'bout that base

Because you know it’s all about that base,
'Bout that base: also called powers
It’s all 'bout that base, 'bout that base, like towers
It’s all 'bout that base, 'bout that base, not like hours
which have a sexagesimal base, different kind of base (ooooh….that’s confusing)

Archimedes

Lyrics by Sam Hartburn and Phil Chaffé 2018, to the tune of Common People by Pulp

He came from Greece, he had a thirst for knowledge
He studied circles to improve his knowledge
That’s when pi, Caught his eye
He looked for an approximation
A way to ease the calculation of pi
By making circles out of lines, oh yeah

I want to be like Archimedes
I want to know whatever Archimedes knew
Want to think like Archimedes
I want to do what Archimedes could do
Like invent a type of screw
So I’ll see what I can do

Tried to put a shape inside a circle
How many sides
would be needed to make it fit?
He chose ninety six
Combined it with an outside poly
He just laughed and found
Each p to d
ratio
Put them into his pi inequality (this line spoken)

I want to be like Archimedes
I want to know whatever Archimedes knew
Want to think like Archimedes
I want to do what Archimedes could do

You’ve got to understand
I want to shake him by the hand

Rent a flat in Syracuse
Wear a toga, nice and loose
Put some sandals on my feet
Go study Greek philosophy

And I might just get it right
As I wind down for the night
Connect the last part of the graph
When I'm relaxing in the bath, yeah

I'm gonna be like Archimedes
I'm gonna know whatever Archimedes knew
Gonna think like Archimedes
Gonna watch ideas slide into view
Like that certain type of screw
Because there's so much else to do-oo-oo-oo-oo

I want to be like Archimedes, I do…..*<repeat to end>*

Blame it on Bernoulli

Lyrics by Colin Beveridge 2018
To the tune of Blame it on the Boogie

v1
I bustled into Basel
With quite a tricky puzzle
I heard there was a boffin there who ought to know

I've got a mid-sized navy
That's gone all misbehavey
My ships keep on colliding in the water flow

CHORUS x2
Don't blame it on the docksides
Don't blame it on the sail size
Don't blame it on the high tides
Blame it on Bernoulli

v2
It was hard to track down Daniel
'Cause for everyone and his spaniel
There's someone in the family that's called the same

At least six Nikolauses
Two Hieronymuses
Two Jakobs and three Johanns who all share a name.

CHORUS x2

Bridge x2
I just can't, I just can't, I just can't control my fleet
I just can't, I just can't, I just can't control my fleet

v3
I asked him if his thinking
Could stop my ships from sinking
Every time the wind blows they're in jeopardy

It turns out their submersion
Is due to the conversion
Between pressure and kinetic energy

CHORUS and BRIDGE until bored or the world ends

Calculus of Integrals

Lyrics by Martin Harris 2018
To the tune of *Cigarettes and Alcohol* by Oasis

When you've got yourself a function
And you want to find the area beneath it all
There's no differentiation
'Cos all you need is the calculus of integrals

If your graph is a straight line
Geometry is just fine
But if it curves just like sine
Just learn to integrate
And you can find the area
Yeah, you can find the area
Yeah, you can find the area
Yeah, you can find the area

Start off with an approximation
Pretend the shape is made of really thin rectangles
With their width's diminution
You find the answer with calculus of integrals

If your graph is a straight line
Geometry is just fine
But if it curves just like sine
Just learn to integrate
And you can find the area

Yeah, you can find the area
Yeah, you can find the area
Yeah, you can find the area

Common Log

Lyrics by Tom Button 2018
To the tune of Hound Dog

You ain't nothin' but a common log
I think you've had your time
You ain't nothin' but a common log
I think you've had your time
Well, you ain't natural and you ain't no friend of mine

You used to help with products
Once upon a time
You used to help with products
Once upon a time
But now my calculator will
Give me results just fine

You ain't nothin' but a common log
Your derivative's a mess
You ain't nothin' but a common log
Your derivative's a mess
There's a weird extra factor that causes me additional stress

Well, you ain't in the theorem
That's used to count the primes
You ain't in the theorem
That's used to count the primes
You don't sum harmonic series or help with hyperbolic sine

You ain't nothin' but a common log
I think you've had your time
You ain't nothin' but a common log
I think you've had your time
Well, you ain't natural and you ain't no friend of mine

Fifty Ways to Fudge your Theorem

Lyrics by Phil Chaffe 2018 (from an original idea by Ben Sparks)
to the tune of 50 Ways to Leave Your Lover by Paul Simon

The problem is all inside your head she said to me
Most mathematicians know it from their PhDs
What you can't prove you bury in appendix 3
Then use the fifty ways to fudge your theorem

She said it's really not my habit to intrude
Furthermore, your faulty logic must be lost, your turpitude
in all your calculations should be used now to occlude
That you've used 50 ways to fudge your theorem
Fifty ways to fudge your theorem

You just fit it to a curve, Merv
Define a new set, pet
You just add a bit on Ron...
Infinitesimally

Say the margin's too small Paul
No room to include it all
Say it's obvious to me, Lee
Topologically

She said it grieves me so to see you in such pain
I'll help you with your thesis writing as it's really far too plain
(She said) you need to obfuscate more and try less to explain
And use the fifty ways

She said why don't you write some more and bulk it out tonight
Its mass is more important than striving to get it right
If it's long they just won't read it they'll just judge it by its height
So use the fifty ways to fudge your theorem
Fifty ways to fudge your theorem

You just fit it to a curve, Merv
Define a new set, pet
You just add a bit on Ron...
Infinitesimally

Say the margin's too small Paul
No room to include it all
Say it's obvious to me, Lee
Topologically

Foldin' and bakin'

Lyrics by Adam Atkinson 2018
To the tune of Wishin' and hopin'

Foldin' and bakin' and codin' and playin'
Sketchin' and printin' a Mobius cam
That will get you into the Jam
So if you're lookin' to find maths you can share
All you gotta to is mix it and bake it and ice it
And show Stecks that you care

Show Matt that you care for his stress
Say that hexagons are a mess
Pentagons on your signs
Cause you will get in
Codin' and a-playin', foldin' and a-bakin'

Cause Foldin' and bakin' and codin' and playin'
Knittin' and soldrin' a new custard tart
That will get you in at the start
So if you're thinkin' of how great rec maths is

All you gotta do is fold it and twist it and code it and bake it
(Yeah), Just do it
And after you do, Jam will be yours

(You gotta) Show Matt that you care about Nim
Play it well like he likes to do
Pentagons on your signs
Cause you will get in
Codin' and a-playin', foldin' and a-bakin'

Cause Foldin' and bakin' and codin' and playin'
Knittin' and soldrin' a new custard tart
That will get you in at the start
So if you're thinkin' of how great rec maths is

All you gotta do is fold it and twist it and code it and bake it
(Yeah), Just do it
And you after you do, Jam will be yours
Jam will be yours
Jam will be yours

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.

Chorus

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.

Chorus

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.

Chorus

George Boole

Lyrics by Tom Button 2018
To the tune of Hey Jude

George Boole, don't be so sad
You took an idea and made it better:
A statement that is 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 conjunction,
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!)

Hypatia Do

Lyrics by Lucy Rycroft-Smith 2018
To the tune of Mama Do by Pixie Lott

Two thousand years ago
She started breaking down those doors
A mathematical hero
Inverse of helpless

She loved the stars of night
Helped build an astrolabe to keep them all in sight
And that's just one reason why
I like to ask this…

What would Hypatia do (uh oh uh oh)
What ontology would she construe (uh oh uh oh)
What would Hypatia say (uh oh uh oh)
Would she solve the problem this way (uh oh uh oh)

Those men should feel ashamed
Tried to stop her gaining monumental fame
But she rose again
And so I ask this..

What would Hypatia do (uh oh uh oh)
Which algorithm would she stick to (uh oh uh oh)
What would Hypatia say (uh oh uh oh)
If she saw this problem today (uh oh uh oh)

All the things a girl should know
Conic sections and ratio
All the things a girl should know
She's my hero

What would Hypatia do (uh oh uh oh)
What strategy would she pursue (uh oh uh oh)
What would Hypatia say (uh oh uh oh)
Pretty sure she wouldn't pray (uh oh uh oh)

Uh oh uh oh
Uh oh uh oh
Uh oh uh oh

I'll Prove the Riemann Hypothesis

Lyrics by Sam Hartburn 2018

To the tune of Mrs Robinson by Simon and Garfunkel

Zeta zeta zeta zeta zeta zeta zee
Zeta zeta zeta zee
Zeta zeta zeta zeta zeta zeta zee

I'll prove the Riemann hypothesis
I'll work hard, how tricky can it be?
Oh zeta zee
To prove the Riemann hypothesis
Fortune holds a place for those who prove
Oh zeta zey, zeta zey

We'd like to know about the distribution of the primes
We'd like to know how far apart they'll be
Look at all the zeros of the zeta function curve
Prove the real part will always be a half

I'll prove the Riemann hypothesis
I'll work hard, how tricky can it be?
Oh zeta zee
To prove the Riemann hypothesis
Fortune holds a place for those who prove
Oh zeta zey, zeta zey

Find a way to look at it that no-one's ever seen
Use a number system with a secret
It's a little method that will give me all I need
Best of all I can explain it to the press

I'll prove the Riemann hypothesis
I'll work hard, how tricky can it be?
Oh zeta zee

To prove the Riemann hypothesis
Fortune holds a place for those who prove
Oh zeta zey, zeta zey

Make a little progress on a Sunday afternoon
Get a bit excited that it's done
Laugh about it, shout about it
Put it in a song
When I check the details, it's wrong

I'll prove the Riemann hypothesis
I'll work hard, how tricky can it be?
Oh zeta zee
To prove the Riemann hypothesis
Fortune holds a place for those who prove
Oh zeta zey, zeta zey

The Irish Thinker

Lyrics by Phil Ramsden
To the tune of The Irish Rover by Pogues/Dubliners

On October 16 eighteen-forty and three
I walked out in the damp mornin' gloom
And as I walked along it came sudden to me
As I crossed at the oul' bridge of Brougham
'Twas a wonderful thought, as I saw that I ought
To remove my mathematical blinkers
And use not two, not three; four components, you see
And they call me the Irish Thinker!

It was early that week that young Archie and Bill
Had inquired over rashers and tay
If I thought that we could, if we had but the will
Introduce a third unit called j
Says I "Not on your life! For the problems are rife,
Sure they'd make a teetotaller a drinker!
So let's just stick with C, leave the rest of it be,
And have done," said the Irish Thinker.

But as I thought again on that cold Dublin morn
All my early ideas seemed banal
Of a sudden a terrible beauty was born
On the banks of the Royal Canal
So with one, i and j, I just threw in a k
And I had the thing, hook line and sinker

Now the problem was bet; my quaternion set
Was the pride of an Irish Thinker!

Well I saw right away that these things were brand new
I'd extended the realm of the known!
Ah so I did I thing I'd not normally do
And I carved them right into the stone
But did Dubliners frown? Did they tear the bridge down?
With my rough-hewn design did they tinker?
Did they get me the sack? No, they put up a plaque
In the name of an Irish thinker!

Mathematicians are always a bothersome lot
Always thinking by night and by day
Ah but I had a hunch that with what I had got
I could blow all the others away
My quaternions talk made me cock of the walk
But then *vectors* arrived; what a stinker!
For a while then it looked as if my goose was cooked
A sad fate for an Irish thinker!

Ah but this story's ending has lifted my heart
As I gaze down on you from on high
For quaternions now are the key to the art
Of convincing 3D CGI
For a modern cartoon you need more than a room
Full of artists and draughtsmen and inkers…
Now that whole Dreamworks crew…
…and the Pixar crowd too…
[pause]
(ONE, TWO, THREE!)
OWE THE LOT to this Irish thinker!

Irrational Root 2

Lyrics by Sam Hartburn 2018
To the tune of Especially for You by Kylie and Jason

Irrational root 2
Suppose it's written in the form p over q
Where p's an integer and q is too
And that fraction is
The smallest one that there is
They are coprime

Irrational root 2
If we square and rearrange then it is true
That p squared equals twice the square of q
So p squared is even
Which means that p's even too
And here comes the clever bit
Four must be a factor of p squared
So two must be a factor of q squared
So two must be a factor of p and q
And that's a contradiction
A contradiction
Because we said that
Those numbers are coprime
And that's the proof that it is irrational root 2

Irrational root 2
One point four one four two one three dot dot dot
It's a number that turns up an awful lot
In the unit square
In sine of pi over four
And even in paper size
Times it by itself to get the first prime number
Construct it for yourself with a ruler and compass
Try to memorise it and you'll probably chunder
Oh, but, what a wonderous number
Wonderous number
It is the greatest of all the surds, it's true
So take some time to think of irrational root 2

I want to make e

Lyrics by Gordon Hayes 2018
To the tune of I want to Break Free

I want to make e
I want to make e
I want to make e from i pi
You should be satisfied I don't need to
But I want to make e
God knows, God knows I want to make e

I'm failing to prove
I'm failing to prove for the first time
But this pi I know it ain't real
I'm failing to prove, yeah
God knows, God knows I'm failing to prove

It's strange but it's true
One over e's the solution to the hat check probl'm too
But I have to be sure
When I walk out that door
Oh how my hat b'longs to me, baby
Oh how my hat b'longs to me
Oh how I want to make e

But life still goes on
I can't get used to living without, living without
Living without Euler, who died
I don't want to live alone, hey
God knows, got to make e on my own

So Bernoulli, can't you see?
I've got to make e
I've got to make e
I want to make e, yeah
I want, I want, I want, I want to make e

I Will Survive

Lyrics by Sam Hartburn 2018
To the tune of I Will Survive by Gloria Gaynor

At first I was afraid, I was petrified
I didn’t know if I should multiply, add or divide
I thought the puzzle would be fun, I thought I could get it done
But I was wrong, and then I couldn’t get along.

And now I’m trapped inside this space.
I just don’t know which operation is the first one I should place
Should I divide before I add?
If I subtract first, is that bad?
I thought I knew the rules but this is driving me quite mad

Now I’m confused, I’m so unsure
Can’t read the comments 'cause they’re not helping anymore
Weren't you the one who said divide before you times?
Did you think I'd listen?
Did you think I’d muddle up the signs?

Oh, no, not I!
I will survive.
Oh, as long as I can calculate I know I'll stay alive.

The trolls'll try to pick a fight
But I'll get the answer right
And I'll survive,
I will survive, hey, hey.

It took all the strength I had just to hold my tongue
People gave so many answers that I thought were wrong.
Then at once it all came clear, all of a sudden I could see
The whole point of the puzzle was its ambiguity!

And you see me, somebody new.
I'm not that naive mathematician who's still battling through.
I will be taken in no more,
Not once more will I be bitten.
Now I'm saving all my thinking for a puzzle that's well written!

Go on now, go. Walk out the door.
Just turn around now 'cause I'm not playing anymore.
Weren't you the one who said that BODMAS would be fine?
You should've bracketed
You should have used a fraction line
Oh, and I
I will survive.
Oh, as long as I ignore this stuff I know I'll stay alive.
I'll do a crossnumber instead
Or I might just go to bed
But I'll survive,
I will survive.

Me and 'Taglia Down in the Schoolyard

By Phil Chaffe 2018
To the tune of Me and Julio Down by the Schoolyard by Paul Simon
Because not all mathematicians are friends!

Well Tartaglia sighed and he rolled out of bed
And ran to give his presentation
He just had to shout what his formula found out
'Bout the roots of the cubic equation

It's against the law
It was against the law
What Tartaglia saw
It was against the law

Then Cardano looked down and spit on the ground
I'm going to steal that stammerer's thunder

Give ‘taglia the shove, steal all the secrets of
The square roots of negative numbers

Well I'm on my way
Quartics are where I'm going
I'm on my way
It’s all goin’ down
In my Ars Magna
Go down in hist’ry, hope no one remembers
‘Bout me an ‘taglia
Down in the schoolyard
‘Bout me and ‘taglia
Down in the schoolyard

Whistled bit (or miss it out)

Well, some centuries have passed, and my “discoveries” last
In a set of complex wonders
With a real part to start
And a radical part
That’s the square root of a negative number

Well I got my way
You all know my name
I got my way
I wrote it all down
In my Ars Magna
Went down in hist’ry, hope no one remembers
‘Bout me an ‘taglia
Down in the schoolyard
‘Bout me and ‘taglia
Down in the schoolyard

‘Bout me an ‘taglia
Down in the schoolyard
‘Bout me and ‘taglia
Down in the schoolyard
‘Bout me an ‘taglia
Down in the schoolyard

Pi by Three

Lyrics by Alison Kiddle 2018
To the Tune of Let it Be by The Beatles

When I find myself a value whose arctan is equal to root three,
Solving gives the answer Pi by 3.
And when I see an equilateral triangle in front of me,
Interior angle Pi by 3.

Pi by 3, Pi by 3, Pi by 3, Pi by 3,
Interior angle Pi by 3.

And when the cosine of an angle's 0.5 then you'll agree
There will be an answer, Pi by 3.
For though there may be other values shifted periodically,
There's a principal value, Pi by 3.

Pi by 3, Pi by 3, Pi by 3, Pi by 3,
There will be an answer, Pi by 3.

And when a cake from MathsJam Bake-off needs to be shared equally,
Shared between six judges, Tau by 6.
But Pi is far superior than Tau and so you'll all agree,
Cut the cake by angle Pi by 3.

Pi by 3, Pi by 3, Pi by 3, Pi by 3,
60 degrees in radians, Pi by 3.
Pi by 3, Pi by 3, Pi by 3, Pi by 3,
There will be an answer, Pi by 3.

The Platonic Solids

Lyrics by Martin Harris 2018
To the tune of Pop! goes the Weasel

12 pentagonal faces
20 points they meet on
30 lines connecting them all
Do! - decahedron

20 triangular faces
12 points they meet on
30 lines connecting them all
I! - cosahedron

8 triangular faces
6 points they meet on
12 lines connecting them all
Oc! - tohedron

6 square faces
8 points they meet on
12 lines connecting them all

Hex! - ahedron

4 triangular faces
4 points they meet on
6 lines connecting them all
Tet! - rahedron

Ptolemy

Lyrics by Martin Harris 2018
To the tune of All of Me

Ptolemy
Why not try Ptolemy?
Can't you see
that it's really useful?

When your shape's quadrilat'ral
with its corners on a circle

Multiply
Opposite pairs of sides
add to find
the product of diagonals

It's always so
and that's good to know
so why not try Ptolemy?

Smells like a disconnected metrizable space

Lyrics by Phil Chaffé 2018
To the tune of "Smells Like Teen Spirit" by Nirvana

Load up on pens, bring your friends
Our decimals they never end
No pattern that can be inferred
No repetition in our world

Hello, hello, no ratios
Hello, hello, no ratios
Hello, hello, no ratios
Hello, hello, hello

With the rationals, it's less dangerous
Here we are now, we're outrageous
We're not naturals or integers
We're irrationals, venerate us
Transcendentals, there's no ratio, root of 2 no, there's no ratio
Yeah, hey

You rationals think you're the best
So countable - we're not impressed
Remember that we're real too
And that there's more of us than you

Hello, hello, no ratios
Hello, hello, no ratios
Hello, hello, no ratios
Hello, hello, hello

With the rationals, it's less dangerous
Here we are now, we're outrageous
We're not naturals or integers
We're irrationals, venerate us
Pi and e no, there's no ratio, log2 three no, there's no ratio
Yeah, hey

You think we're easy to define
And that you know how we combine
But it's so hard, it's hard to find
If pi plus e is of our kind

Hello, hello, hello, how low
Hello, hello, hello, how low
Hello, hello, hello, how low
Hello, hello, hello

With the rationals, it's less dangerous
Here we are now, don't ignore us
We're not rationals or integers
We're irrationals, please don't hate us
Pi and e no, log2 three no, square root 2 no, there's no ratio
A decimal, a decimal, a decimal, a decimal, a decimal
A decimal, a decimal, a decimal, a decimal…..
(that never repeats and never ends)

That Ain’t No Valid Set

Lyrics by Martin Harris 2018
To the tune of You Ain’t Seen Nothin’ Yet by Bachman Turner Overdrive

I met a clever woman
She taught me a new game
where attributes must all be different
Or all of them the same

And so I picked up three cards
That she had dealt out of the deck
She looked at me with big brown eyes and said ...

That ain’t no valid set
B-b-b-baby, no, that ain’t no valid set
Two of them are green and one is red
B-b-b-baby, no, that ain’t no v-v-v-valid set

There’s red and green and purple
Hollow, solid and stripey
There’s diamonds, waves and ovals
In groups of one, two ‘n’ three

There’s three rules I remember
But always one that I forget
And then she looks at me with them big brown eyes and says...

That ain’t no valid set
B-b-b-baby, no, that ain’t no valid set
Only three out of four conditions are met
B-b-b-baby, no, that ain’t no v-v-v-valid set

And so I tried one more time
There was one that I could get
And finally she looked at me with them big brown eyes and said ...

You found a valid set!
B-b-b-baby, yeah, you found a valid set!
We’ll make an expert of you yet
B-b-b-baby, yeah, you found a v-v-v-valid set!

The Topologist

Lyrics by Phil Chaffé, Sam Hartburn, Lucy-Rycroft Smith and Ben Sparks
Piano Man - Billy Joel

It’s five o’clock in the common room
The regular crowd shuffles in
There’s an old man sitting next to me
He’s wild eyed and scratching his chin
He says, "Son, can you find me a manifold
I'll tell you the things that I know
It’s metrizable, separable,
and locally contractible
And it makes my poor old brain go

La la la, di da da
La la, di da da da dum

Deform us some space you’re the topologist
Deform us some space tonight
We’re all in the mood for homotopy
You’ve gotta deform it alright

Now John takes statistical modelling
With undergrads in years 2 & 3
And he's quick with a joke 'bout that Bernoulli bloke
But there's someplace that he'd rather be
He says, "man, all this data is killing me."
As the smile ran away from his face
"Well I'm sure that I could teach analysis
If I could get out of this place"

La la la, di da da
La la, di da da da dum

Now Paul is a theoretical physicist
Who never had time for a wife
And he's talkin' with Rita, who's studying Fujita
And probably will be for life
And the postdocs are wrestling with Poincaré
As the professors all look on and groan
While they're kicking round 4-sphere morphologies
It's much better than workin' alone

La la la, di da da

La la, di da da da dum

Deform us some space you’re the topologist
Deform us some space tonight
We’re all in the mood for homotopy
You’ve gotta deform it alright

It's a pretty good crowd for a Saturday
And the manager gives me a smile
'Cause he knows that it's shape at which they’ve come to gape,
To forget about life for a while
And the doughnut it looks like a coffee cup
And the cuboid looks like a sphere
Oh the light in their faces, when we sing about spaces,
Cos it’s just what they wanted to hear.

La la la, di da da
La la, di da da da dum

Deform us some space you’re the topologist
Deform us some space tonight
We’re all in the mood for homotopy
You’ve gotta deform it alright

Turing Machine

Lyrics by Phil Ramsden 2018
To the tune of Silver Machine - Hawkwind

I, I’ve gone for a ride
Upon my Turing machine,
And I don’t know what this means
Oh do you want to know, will the ride ever end
Well I can’t tell you my friend
It ain’t no use to pretend

Yeah they fly, the ones and zeros fly by
But will they stop by and by
And if so, when and why?

I got a Turing machine
I got a Turing machine
I got a Turing machine

See my Turing machine

It calculates like a dream
But will it halt nice and clean
Do you get what I mean?
Oh do you want to know, will the ride ever end
Well I can't tell you my friend
It ain't no use to pretend

I got a Turing machine
I got a Turing machine
I got a Turing machine
See my Turing machine

I, I just can't decide
Whether this thing will halt,
And it's all Turing's fault

I got a Turing machine
I got a Turing machine
I got a Turing machine
See my Turing machine

Volume for Nothing

Lyrics by Phil Ramsden 2018
To the tune of Money for Nothing

Now look at them yo-yos, that's the way you do it
Mr S Banach, Mr A TarSKI
That ain't cheatin', that's the way you do it
Volume for nothin' and a sphere for free

Now that ain't cheatin', that's the way you do it
Lemme tell you that them guys got balls
OK, they had to use the Axiom of Choice
You use just ZF and the damn thing falls

We got a free group decomposition
Slice the sphere up paradoxicall-y-y-y-y
We got to use these two generators
We got to move round in 3d-ee

See the little guy with the arccos-one-third rotation
Yeah, man, that's the x-axis there

And now a spin around the vertical just like it
And he can travel close to anywhere

We got a free group decomposition
Slice the sphere up paradoxicall-y-y-y-y
We got to use these two generators
We got to move round in 3d-ee

We got a free group decomposition
Slice the sphere up paradoxicall-y-y-y-y
We got to use these two generators
We got to move round in 3d-ee

I woulda thought if you sliced a sphere up
It wouldn't matter in how many bits
You'd get just one when you put it back together
When the last piece fits

But it turns out, guess what? The paradox is
If you choose your subsets carefully
It ain't cheatin', that's the way you do it
Get your volume for nothin', get a sphere for free

We got a free group decomposition
Slice the sphere up paradoxicall-y-y-y-y
We got to use these two generators
We got to move round in 3d-ee

Listen here

Now that ain't cheatin', that's the way you do it
Use the method of Banach-TarSKI
That ain't cheatin', that's the way you do it
Volume for nothin', a sphere for free

Volume for nothin', sphere for free
Volume for nothin', sphere for free
Volume for nothin', sphere for free
Volume for nothin', sphere for free
Volume for nothin', sphere for free
Volume for nothin', sphere for free

Easy, easy, volume for nothin', sphere for free
(I want Banach-TarSKI)
(Volume for nothin', sphere for free)

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 -