Number Theory and Riemann Hypothesis Conjecture Proposed Proof

Shaimaa said soltan[1]

[1] Computer Engineer, Toronto, Canada

Correspondence: Shaimaa Soltan, 3050 Constitution Blvd, Mississauga, ON., L4Y 3X1, Canada. Tel: 1-647-801-6063
E-mail: shaimaasultan@hotmail.com

Suggested Reviewers (Optional)

Please suggest 3-5 reviewers for this article. We may select reviewers from the list below in case we have no appropriate reviewers for this topic.

Name:	E-mail:
Affiliation:	

Name:	E-mail:
Affiliation:	

Name:	E-mail:
Affiliation:	

Name:	E-mail:
Affiliation:	

Name:	E-mail:
Affiliation:	

Number Theory and Riemann Hypothesis Conjecture Proposed Proof

Abstract

In This paper we will study the power function inside different fields, First we will study power functions in a small field $\varphi(\ i\ )$; a filed that includes mainly the imaginary number $[\ i\ ]$. during this step we will go through the complex plane imaginary axis as a projection for the square roots of all negative natural numbers. Then we will increase the field of the power function to include [e] then study power functions in this new field $\varphi(\ i\ \ ,e)$. Then we will increase the field of the power function again to include $[\pi]$ then study power functions in the new field $\varphi(\ i\ \ ,e\ ,\ \pi)$

Using these fields breakdown, we will propose a proof Riemann hypothesis on none-trivial zeros for Zeta function.

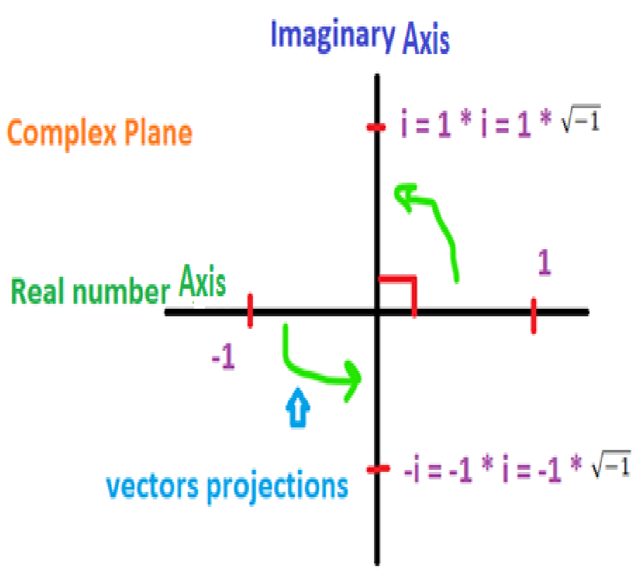
Keywords: zeta function, Riemann hypothesis, complex plane, none-trivial zeros, critical strip

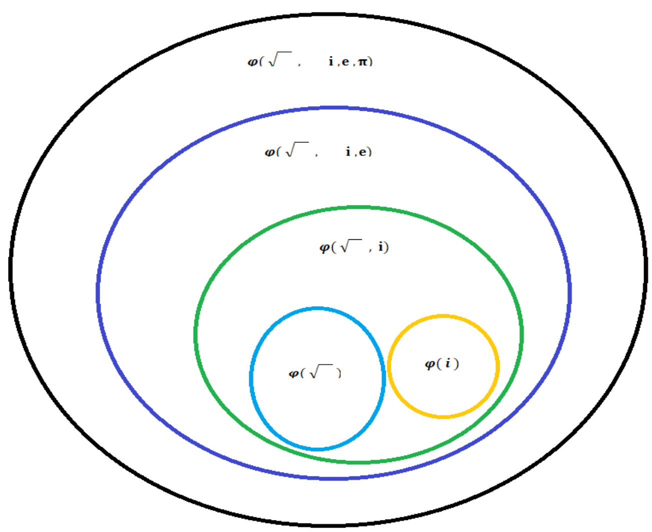
1. Introduction

We are going to study power function in this domain field $\varphi(\ \sqrt{\ \ }\ , i, e\ , \pi\ )$ and all its sub fields one by one from smallest field to the largest field.

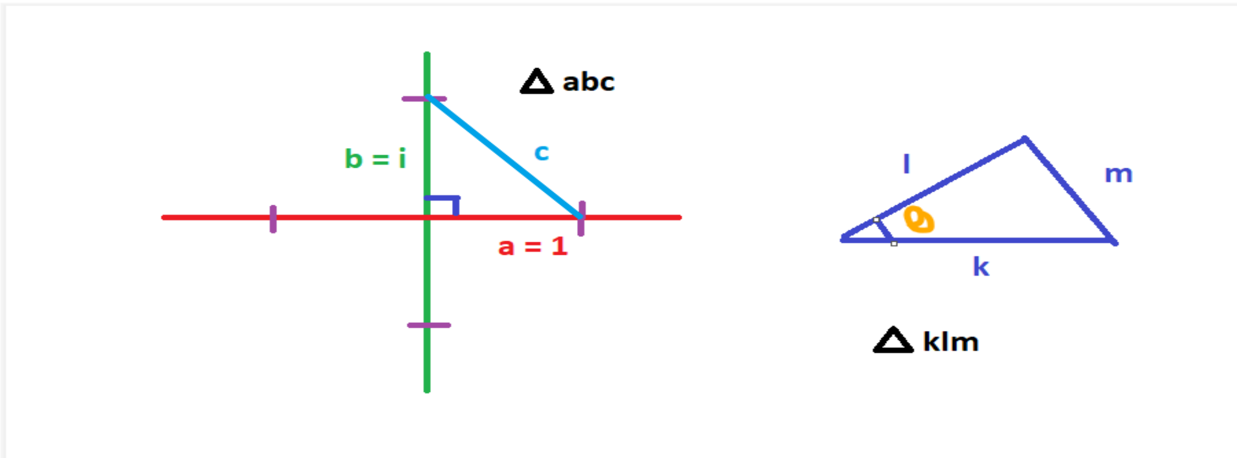
$$[i]\ is\ a\ unit\ imagenary\ number\ in\ the\ complex\ plane\ and\ i = \sqrt{-1}$$

In complex plane, $[i]$ is unit of projection on the imaginary axis as a vector of length 1 and orthogonal to the real number line. In general, we can say, imaginary axis in complex plane is a projection for negative square roots, normalized with imaginary unit $[i]$.





1.1 Square roots projection on Imaginary axis in complex plane



IF in Triangle (k l m)

$$m^2 = k^2 + l^2 - 2\ \mathrm{k} * \mathrm{l} * \cos(\theta)$$

THEN Triangle (a b c)

In complex plane $i = 1$ *unit vector projection; on the imaginary axis*

$$from\ this\ Triangle\ (a\ b\ c)\ ; then\ a = 1\ ; b = 1 * i;\ then\ c = \sqrt{2}\ ;$$
$$because\ \ c^2 = a^2 + b^2 - 2\ \mathrm{a} * \mathrm{b} * \cos(\theta)$$

Therefore, complex plane Imaginary axis, is a projection for all negative square roots of the real number line with a unit of $i = \sqrt{-1}$

And because this axis is a square root, then its origin must be power of two.
And we all know any function with power two must have two solutions [±].
Then if $i = \sqrt{-1}$ *is one solution then there will be another solution* $-i = -\sqrt{-1}$

And this what will produce the sign oscillation and rotation in complex plane as we raise $i = \sqrt{-1}$ to some power bigger than one.

1.2 Roots and Natural number partitions

$$\sqrt{\boldsymbol{Perfect\ squre}} = \sqrt{\boldsymbol{A} * \boldsymbol{A}} = \boldsymbol{A} = \boldsymbol{Natural\ Number}$$

$$\sqrt{\boldsymbol{Not\ Perfect\ squre}} = \boldsymbol{A} \pm \frac{\boldsymbol{1}}{\boldsymbol{A}} = \boldsymbol{Real\ Number}$$

2. Study power function in a field of $\varphi(\,\boldsymbol{i}\,)$

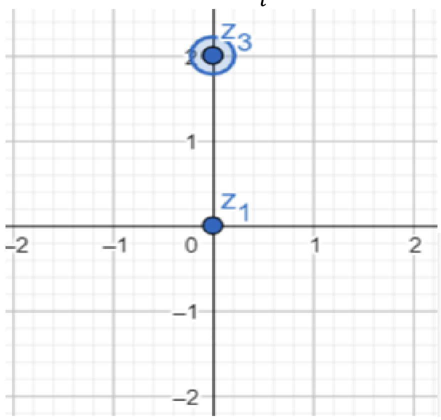
Is $i = \sqrt{-1}$ a perfect square or not?

A) Adding one part $\frac{1}{i}$ to i , give us Zero complex number because $\frac{1}{i} = -i$ and $i = \sqrt{-1}$

$$z_1 = i + \frac{1}{i}$$

$\rightarrow 0i$

B) Subtracting one part $\frac{1}{i}$ from i ; the result will be $2 * i$ because $i = \sqrt{-1}$



$$z_2 = i - \frac{1}{i}$$

$\rightarrow 2i$

How we get twice the Number by subtracting one part from it?

If $i = \sqrt{-1}$; $then\ i^2 = -1; then\ we\ can\ replace - 1\ by\ i^2$

$$i - \frac{1}{i} = i + \frac{i^2}{i} = 2 * i$$

$$z_3 = i + \frac{i^2}{i}$$

$\rightarrow 2i$

2.1 Study power function ($A^{f(i,S)}$] in a field of $\varphi(\sqrt{\ })$

A) Study Case $\sqrt{2}$

$$\sqrt{2}-\frac{1}{\sqrt{2}}=\frac{\sqrt{2}*\sqrt{2}-1}{\sqrt{2}}=\frac{2-1}{\sqrt{2}}=\frac{1}{\sqrt{2}}$$
$$\sqrt{2}+\frac{1}{\sqrt{2}}=\frac{\sqrt{2}*\sqrt{2}+1}{\sqrt{2}}=\frac{2+1}{\sqrt{2}}=\frac{3}{\sqrt{2}}$$

B) Study Case $\sqrt{3}$

$$\sqrt{3}-\frac{1}{\sqrt{3}}=\frac{\sqrt{3}*\sqrt{3}-1}{\sqrt{3}}=\frac{3-1}{\sqrt{3}}=\frac{2}{\sqrt{3}}$$
$$\sqrt{3}+\frac{1}{\sqrt{3}}=\frac{\sqrt{3}*\sqrt{3}+1}{\sqrt{3}}=\frac{3+1}{\sqrt{3}}=\frac{4}{\sqrt{3}}$$

C) Study Case $\sqrt{4}$

4 is perfect square.

$$\sqrt{4}-\frac{1}{\sqrt{4}}=\frac{\sqrt{4}*\sqrt{4}-1}{\sqrt{4}}=\frac{4-1}{\sqrt{4}}=\frac{3}{\sqrt{4}}=\frac{3}{2}$$
$$\sqrt{4}+\frac{1}{\sqrt{4}}=\frac{\sqrt{4}*\sqrt{4}+1}{\sqrt{4}}=\frac{4+1}{\sqrt{4}}=\frac{5}{\sqrt{4}}=\frac{5}{2}$$

D) Study Case $\sqrt{5}$

$$\sqrt{5}-\frac{1}{\sqrt{5}}=\frac{\sqrt{5}*\sqrt{5}-1}{\sqrt{5}}=\frac{5-1}{\sqrt{5}}=\frac{4}{\sqrt{5}}$$
$$\sqrt{5}+\frac{1}{\sqrt{5}}=\frac{\sqrt{5}*\sqrt{5}+1}{\sqrt{5}}=\frac{5+1}{\sqrt{5}}=\frac{6}{\sqrt{5}}$$

E) Study Case $\sqrt{6}$

$$\sqrt{6}-\frac{1}{\sqrt{6}}=\frac{\sqrt{6}*\sqrt{6}-1}{\sqrt{6}}=\frac{6-1}{\sqrt{6}}=\frac{5}{\sqrt{6}}$$
$$\sqrt{6}+\frac{1}{\sqrt{6}}=\frac{\sqrt{6}*\sqrt{6}+1}{\sqrt{6}}=\frac{6+1}{\sqrt{6}}=\frac{7}{\sqrt{6}}$$

F) Study Case $\sqrt{7}$

$$\sqrt{7}-\frac{1}{\sqrt{7}}=\frac{\sqrt{7}*\sqrt{7}-1}{\sqrt{7}}=\frac{7-1}{\sqrt{7}}=\frac{6}{\sqrt{7}}$$
$$\sqrt{7}+\frac{1}{\sqrt{7}}=\frac{\sqrt{7}*\sqrt{7}+1}{\sqrt{7}}=\frac{7+1}{\sqrt{7}}=\frac{8}{\sqrt{7}}$$

G) Study Case $\sqrt{8}$

$$\sqrt{8}-\frac{1}{\sqrt{8}}=\frac{\sqrt{8}*\sqrt{8}-1}{\sqrt{8}}=\frac{8-1}{\sqrt{8}}=\frac{7}{\sqrt{8}}$$
$$\sqrt{8}+\frac{1}{\sqrt{8}}=\frac{\sqrt{8}*\sqrt{8}+1}{\sqrt{8}}=\frac{8+1}{\sqrt{8}}=\frac{9}{\sqrt{8}}$$

In general

$$\left(\sqrt{a}-\frac{1}{\sqrt{a}}\right)=\frac{a-1}{\sqrt{a}}\ \ AND\ \left(\sqrt{a}+\frac{1}{\sqrt{a}}\right)=\frac{a+1}{\sqrt{a}}$$

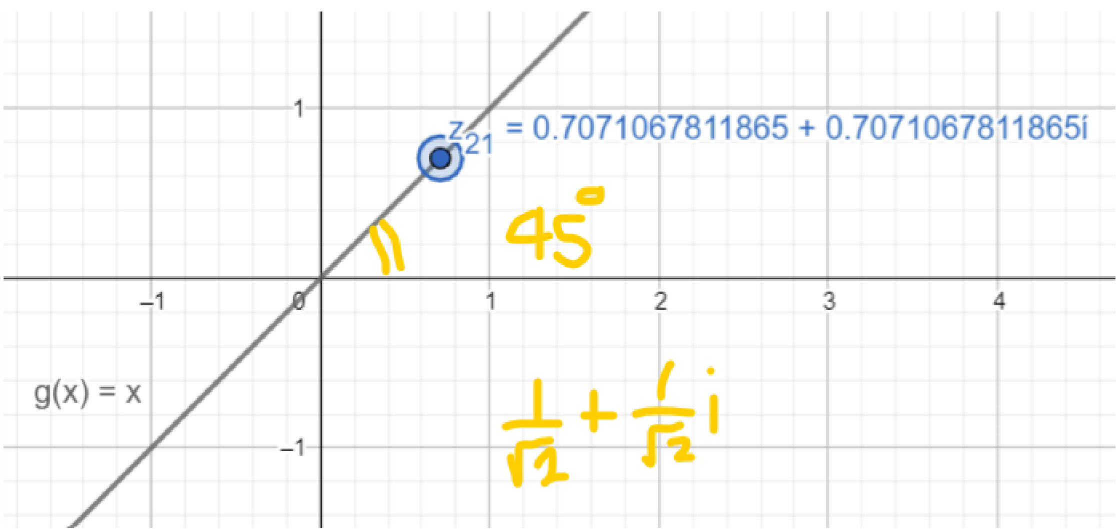
$$\left(\sqrt{a}-\frac{1}{\sqrt{a}}\right)=\begin{cases}\dfrac{2*\left(\frac{a}{2}+\frac{1}{2}\right)-2}{\sqrt{a}};\ for\ any\ odd\ [a]\\ \quad\dfrac{a-1}{\sqrt{a}}\ for\ any\ even\ [a]\end{cases}$$

$$\left(\sqrt{a}+\frac{1}{\sqrt{a}}\right)=\begin{cases}\dfrac{2*\left(\frac{a}{2}-\frac{1}{2}\right)+2}{\sqrt{a}};\ for\ any\ odd\ [a]\\ \quad\dfrac{a+1}{\sqrt{a}}\ for\ any\ even\ [a]\end{cases}$$

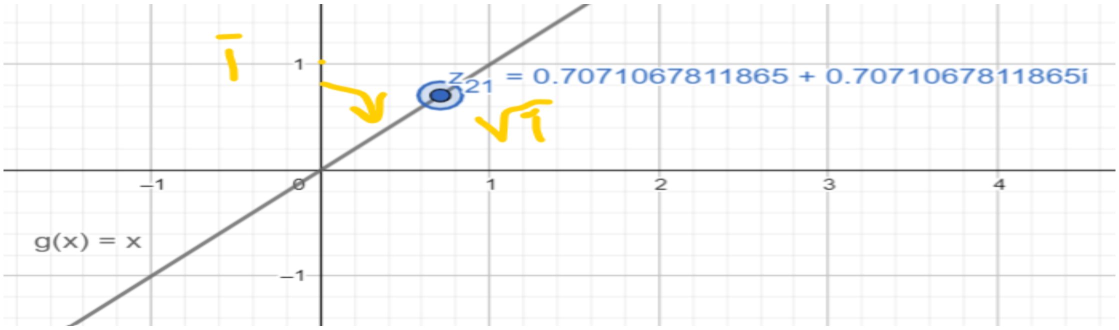
2.2 Study power function in a field of $\boldsymbol{\varphi}(\sqrt{\ \ }\ ,\ \mathbf{i})$

We are going to study a field of square root and [i] together.

$$\sqrt{i}=\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{2}}\ i$$
$$\sqrt{2}*\sqrt{i}=\sqrt{2i}\ =(i+1)$$
$$i=\ \sqrt{2i}-1$$



So, when we took the square root of [i] we moved backwards by 45 degrees as [i] original orientation is at 90 degrees.



What is the relation between $\sqrt{i}\ and\ \sqrt{2}$?

$$\sqrt{2i} = i + 1$$

$$\frac{\sqrt{2i}}{2} = \frac{i}{2} + \frac{1}{2}$$

$$\sqrt{i} = \frac{i}{\sqrt{2}} + \frac{1}{\sqrt{2}}$$

$$\frac{\sqrt{i}}{\sqrt{2}} = \frac{i}{2} + \frac{1}{2}$$

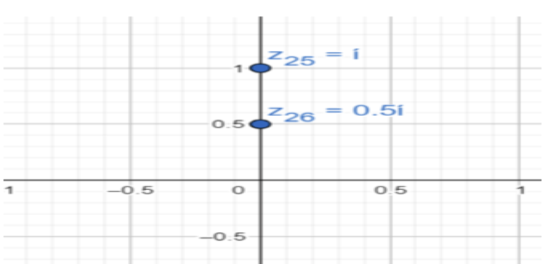
$$\sqrt{\frac{i}{2}} = \frac{i}{2} + \frac{1}{2}$$

So, at half imaginary unit on imaginary axis, we can replace $\frac{i}{2}$ with $\frac{i}{2}$ as our new unit measure will be a smaller unit measured as half i and we are keep going call it i ; because i is not a value it is direction and projection unit only. It is like going in the shrinking direction. So, as we do in normal complex plane with unit imaginary [i] by replacing any -1 with i^2; then in the square roots complex plane we are going to replace every -1 with $(i)^2 + 0.5$. (We only need a complex plane that defines $\sqrt{-1}$ with $\sqrt{-1} + 0.5$)

Then by replacing $\frac{i}{2}$ with i

$$\sqrt{\frac{i}{2}} = \frac{i}{2} + \frac{1}{2}\ ;Replace\ \frac{i}{2} with\ i\ as\ we\ are\ moving\ to\ use\ half\ the\ projection\ unit\ measure$$

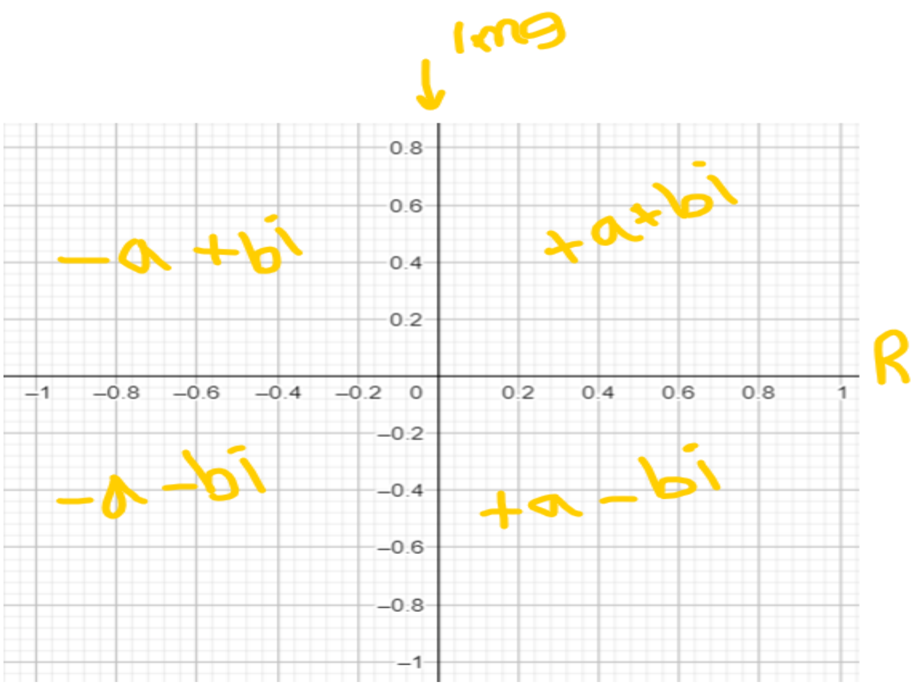
$$\sqrt{i} = i + \frac{1}{2}\ ;when\ we\ use\ half\ the\ projection\ unit\ measure$$



2.3 Study rotation affect on complex plane power function in a field of $\varphi(\sqrt{}\ , \mathbf{i})$

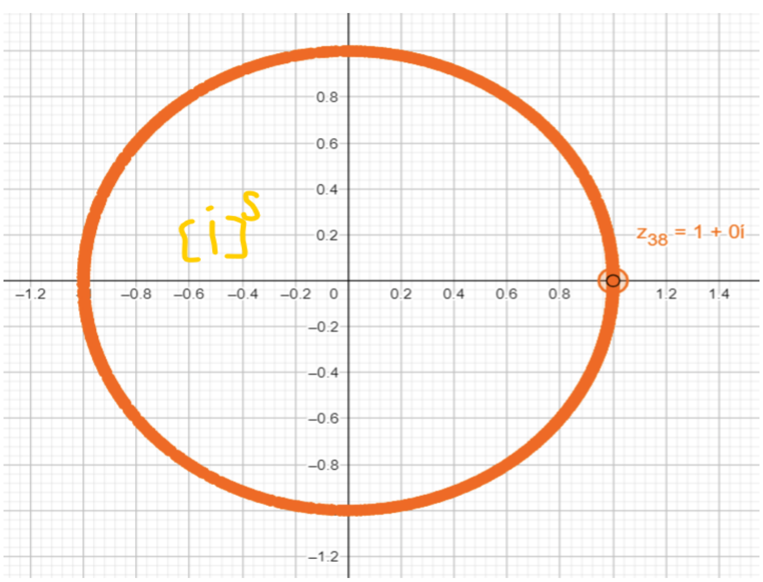
By definition

$$i^S = \begin{cases} \pm 1\ ; when\ S\ is\ even\ natural\ number \\ \pm i\ ; when\ S\ is\ odd\ natural\ number \\ \pm a \pm bi\ ; when\ S\ is\ a\ Real\ number \end{cases}$$



So as [S] changes i^S will be changing and rotating on the 4 sides of the complex plane.

This is a trace for complex number i^S as S is a real value in interval [5,5]



What will be the effect of adding one to [i] and then raise to power S?

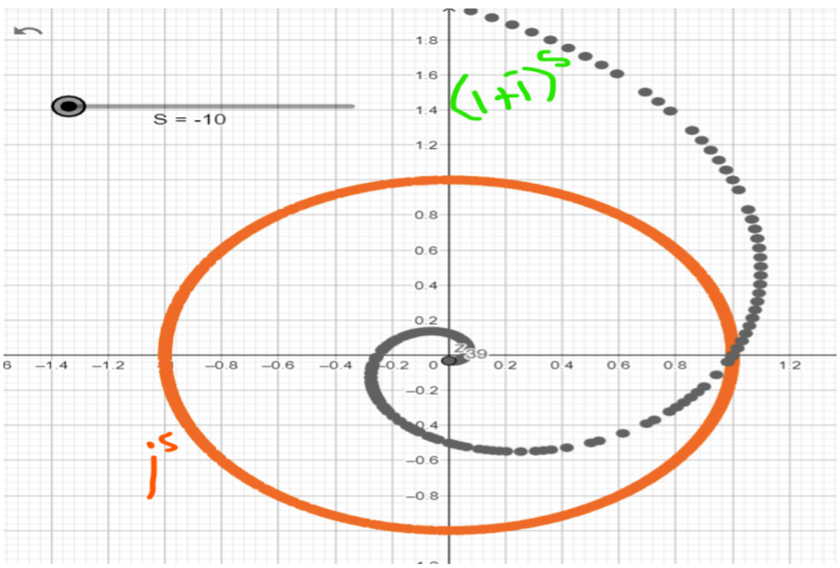
As we see here the trace shows that the vector length is changing each time S increase

And this is simply because the fact

$$\sqrt{2i} = i + 1$$

Which will increase our vector length by factor of 2 each time S increase. This is why the trace shows this spiral shape.

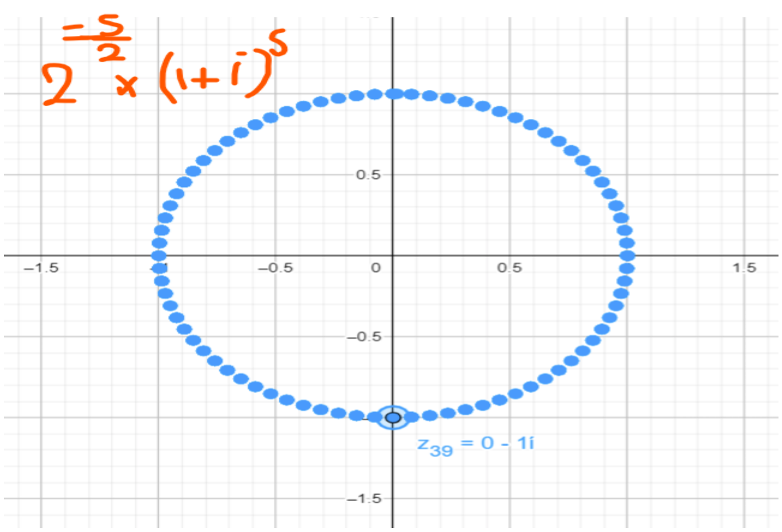
$$\left(\sqrt{2i}\right)^{s} = i^{\frac{S}{2}} * 2^{\frac{s}{2}}$$



Therefore, to make it go back to normal vector unit [i] (normalize it to go back to the rotational effect)

We just need to reverse the affect of this factor of 2.

$$2^{\frac{-s}{2}} * (i+1)^{s} = i^{S}$$

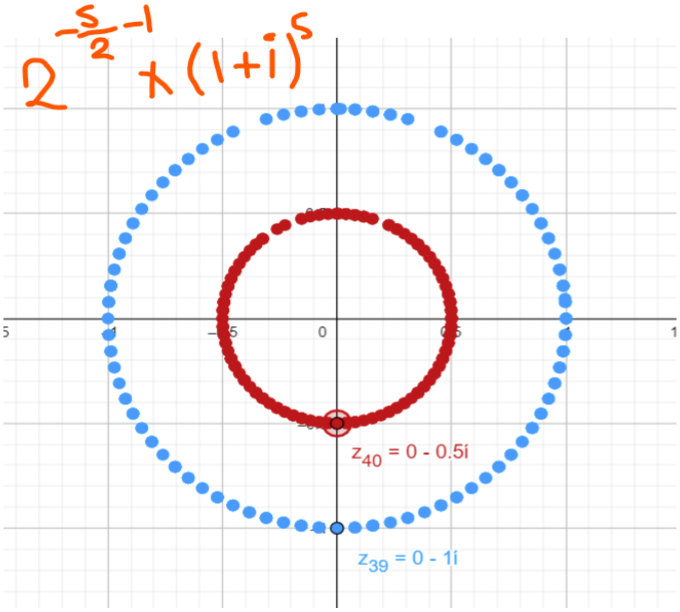


If we multiply this formula by $\frac{1}{2}$; (same operation was done in analytical continuity concept)

$$\frac{1}{2} * (1+i)^S = \frac{1}{2} * 2^{\frac{-S}{2}} * (1+i)^S$$

$$\frac{(1+i)^S}{2} = 2^{\frac{-S}{2}-1} * (1+i)^S$$

We get a complex number trace of circle with radius = 0.5.

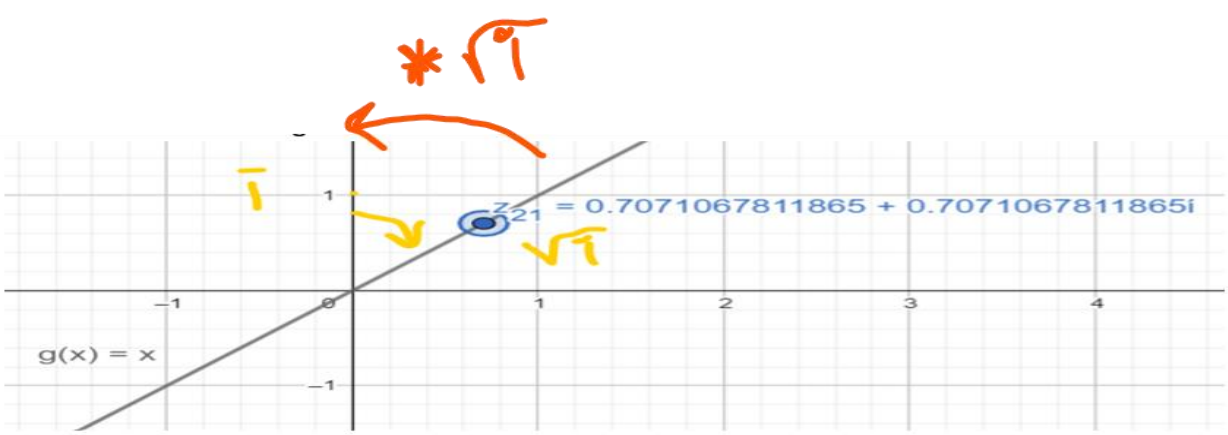


$$using\ only\ [i]\ instead\ of\ using\ [\sqrt{2i}-1]\ ;\ \ do\ hids\ these\ powers\ of\ 2$$

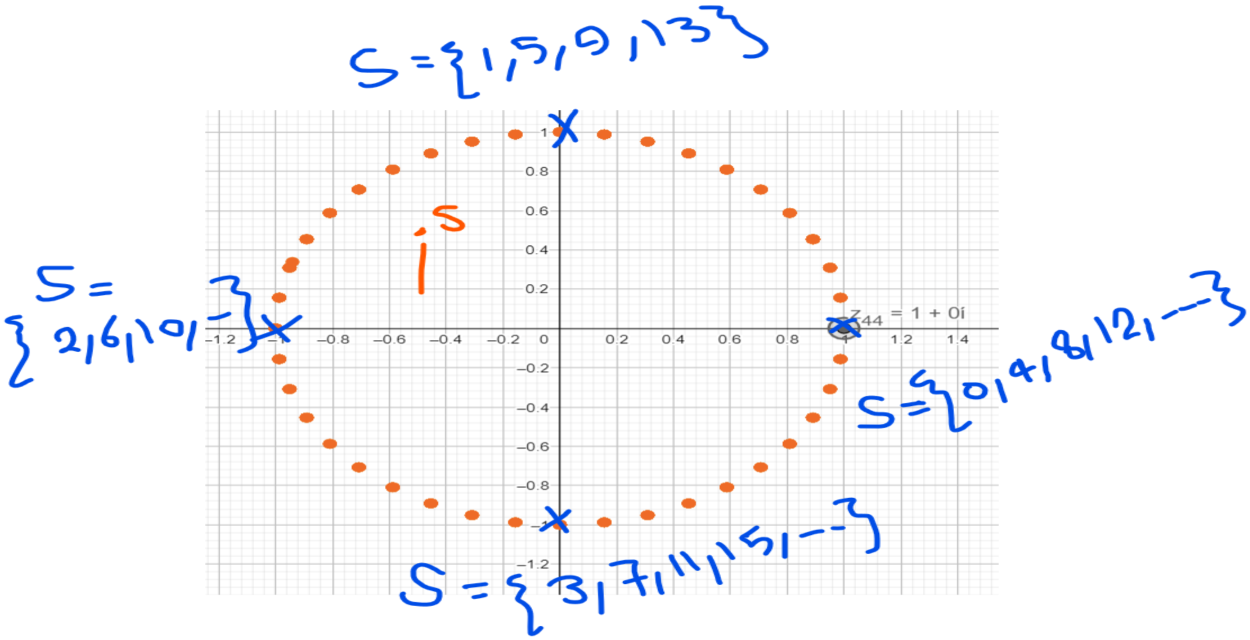
$$Because\ i+1=\sqrt{2i}$$

$$then\ the\ ratio\ between\ both\ for\ any\ power\ \frac{(i+1)^s}{\left(\sqrt{2i}\right)^S}=1$$

Ans as $\sqrt{i}$ is lagged by 45 degrees from i ; so, to do normalize and do the projection back to imaginary axis we need to reverse the affect of this lagged $\sqrt{i}$ by multiply by $\sqrt{i}$

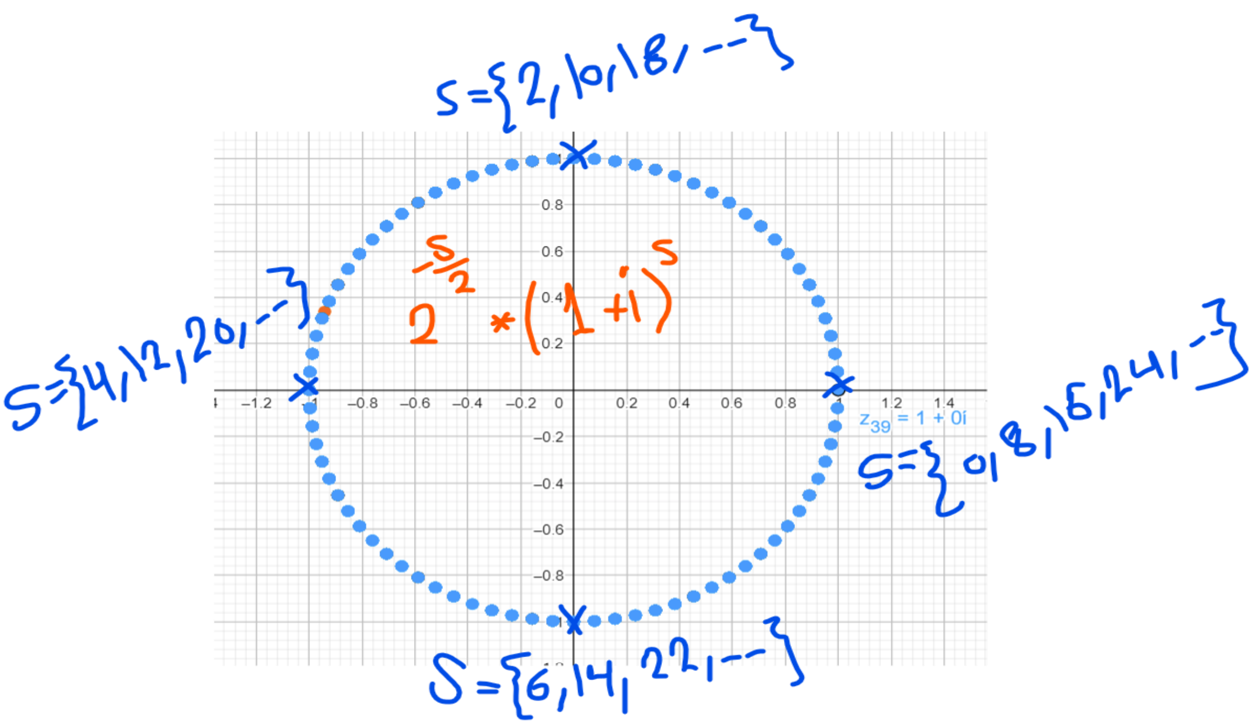


$$(i)^S = \begin{cases} 1\,;when\ S\ is\ even = \{0,4,8,12,\ldots\} \\ -1\,;when\ S\ is\ even = \{2,6,10,14,\ldots\} \\ +i\,;when\ S\ is\ odd = \{1,5,9,13,\ldots\} \\ -i\,;when\ S\ is\ odd = \{3,7,11,15,..\} \\ \pm a \pm bi\,;when\ S\ is\ a\ Real\ number \end{cases}$$



Because $(1+i)^S$ will give us variable vector length then we are going to use the normalized form

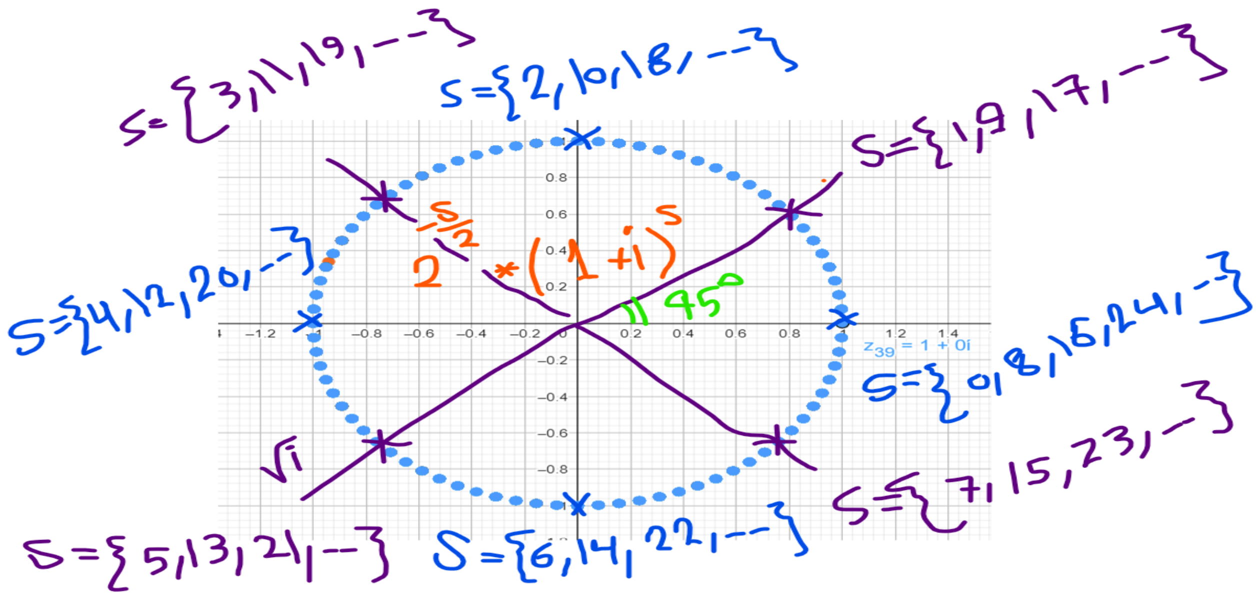
$$2^{\frac{-S}{2}} * (1+i)^S$$



As we see from this normalization, we never get Zeros if [S] is odd numbers.

because if [S] means we will still have one square root of [i] $i + 1 = \sqrt{2i}$

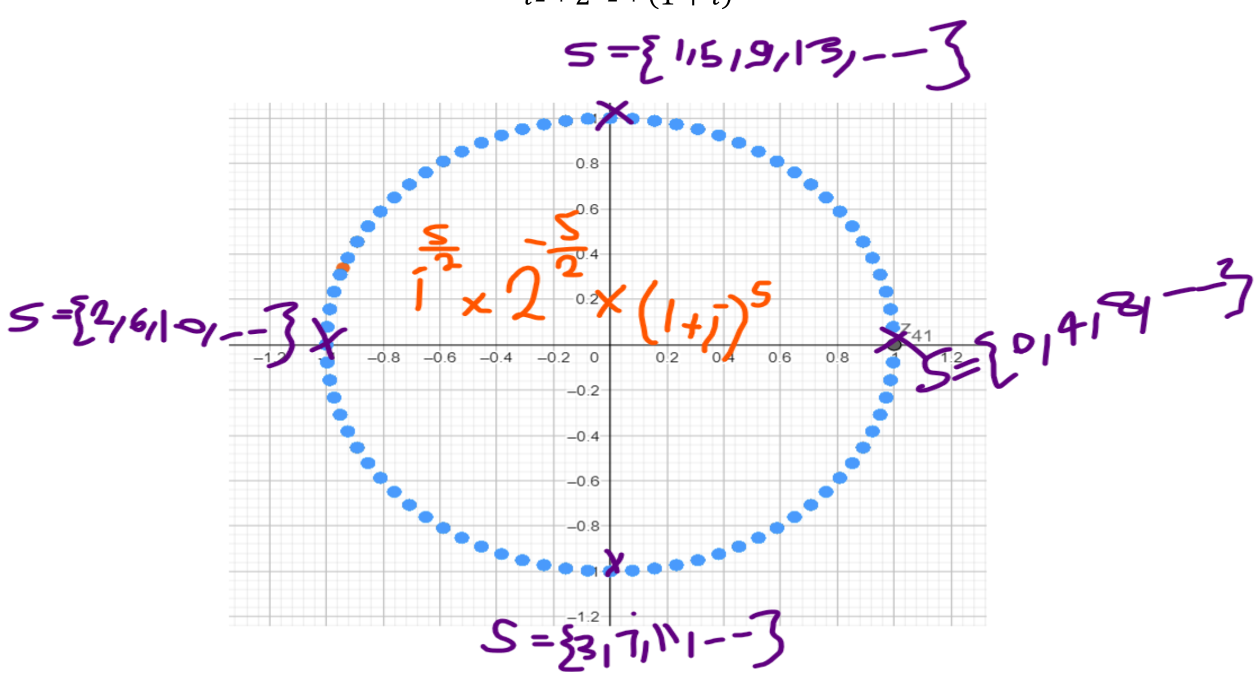
so, all odd values of [S] will be lagged by 45 degrees as we saw before. And this is why the even values steps differences are [2].



Therefore, to get Zeros at odd values of [S] we need to reverse the affect of 45 degrees to move.

$\sqrt{i}$ axis to be projected on the imaginary axis.

$$i^{\frac{S}{2}} * 2^{-\frac{S}{2}} * (1+i)^S$$



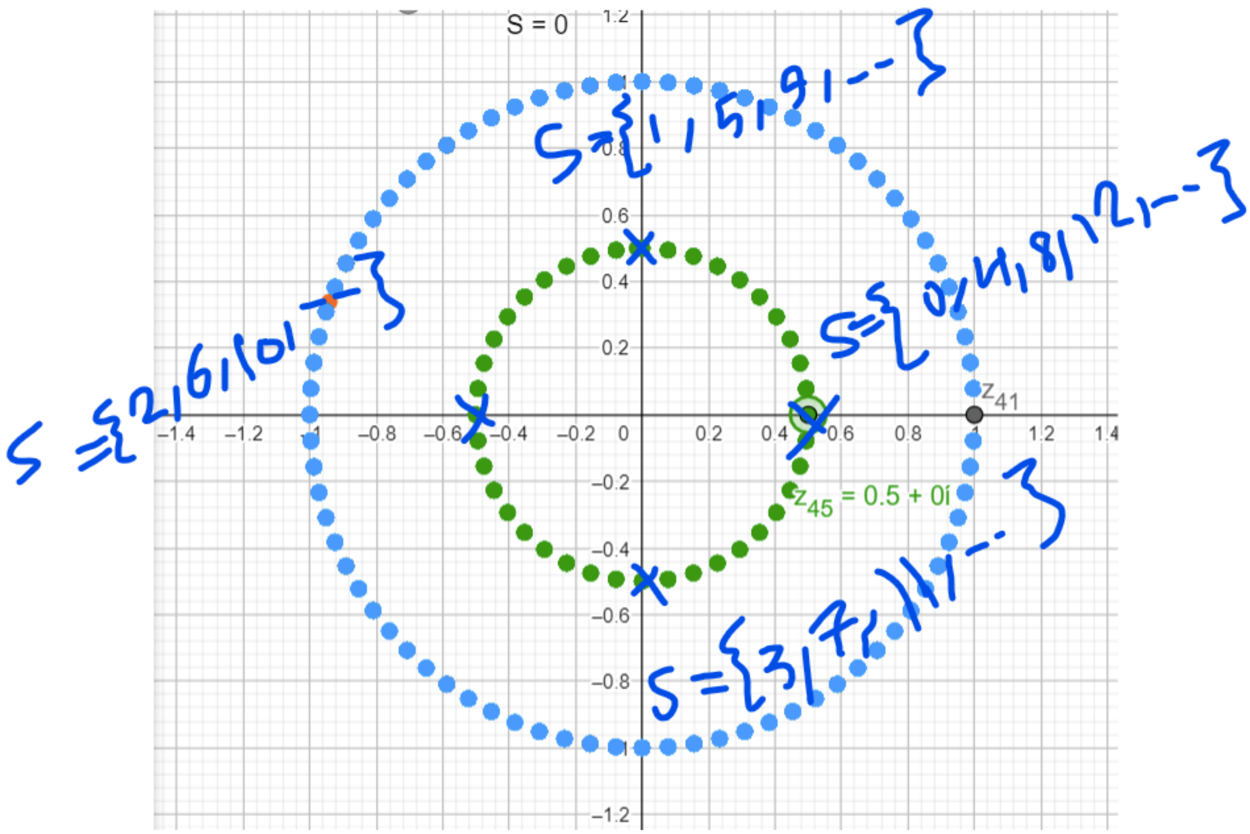
Now if we applied the analytical continuity effect which in summary is divide by [2].

Then our normalized formula will be

$$i^{\frac{s}{2}} * 2^{-\frac{S}{2}-1} * (1+i)^{S}$$

This will give us normalized identity imaginary unit Circle with radius = $\frac{i}{2}$

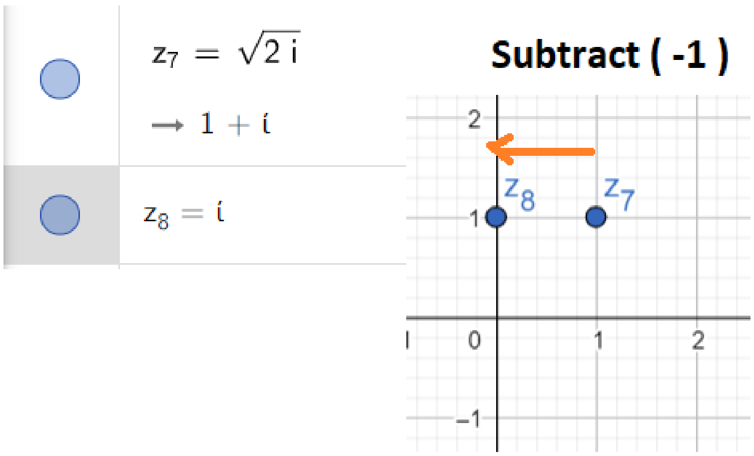
$$i^{\frac{s}{2}} \times 2^{-\frac{s}{2}-1} \times (1+i)^{s}$$



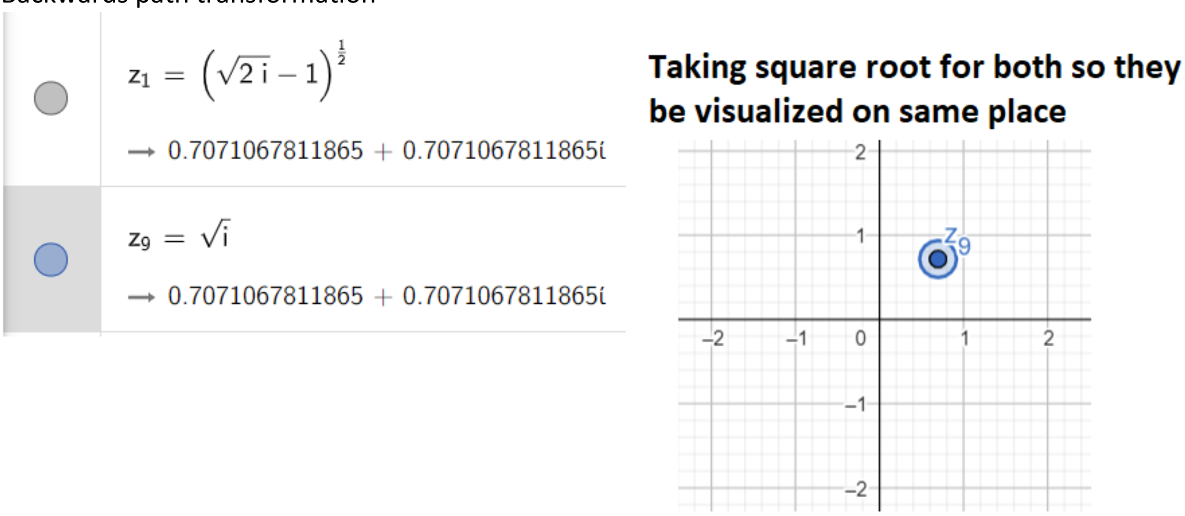
So, in summary, as we saw in this section, to move between the two fields $\varphi(\sqrt{\ }\ ,\ \mathbf{i})$ (between $\sqrt{i}$, $\mathbf{i}$)

We need to do forward or backwards normalization one.

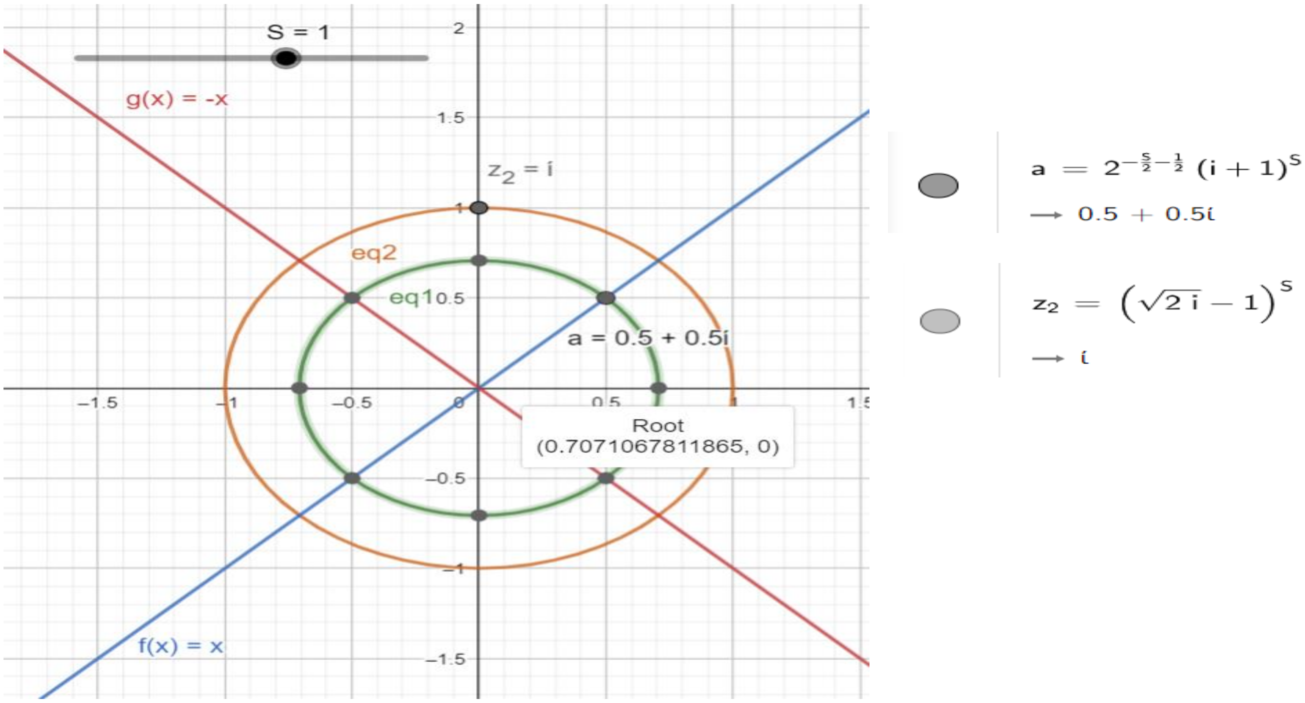
1- Forward path transformation



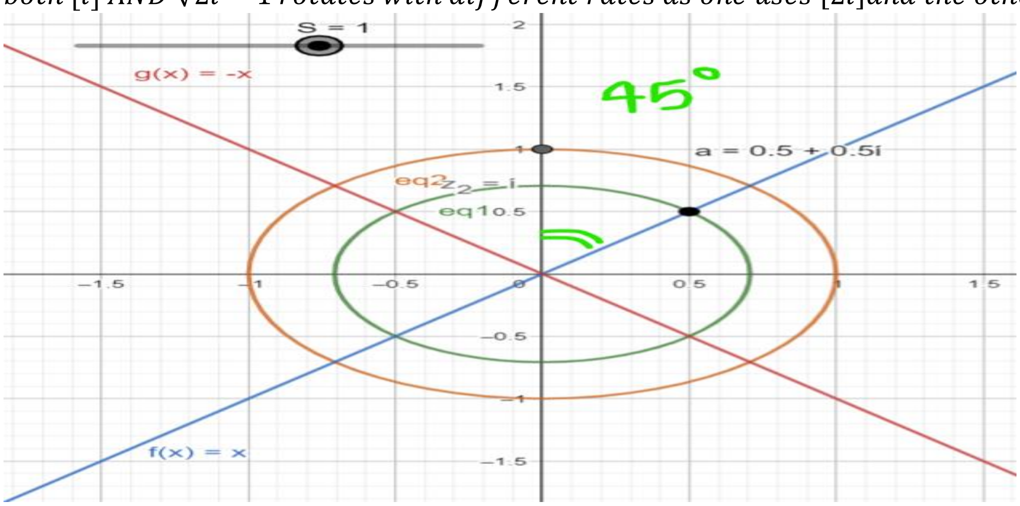
2- Backwards path transformation



3- At S = 1; $\left(\sqrt{2\boldsymbol{i}}-\mathbf{1}\right)^{S} = \boldsymbol{i}$; ***and*** ; $\mathbf{2}^{\frac{-S}{2}-\frac{1}{2}}\,(\boldsymbol{i}+\mathbf{1})^{S} = \mathbf{0.5}+\mathbf{0.5}\,\boldsymbol{i}$

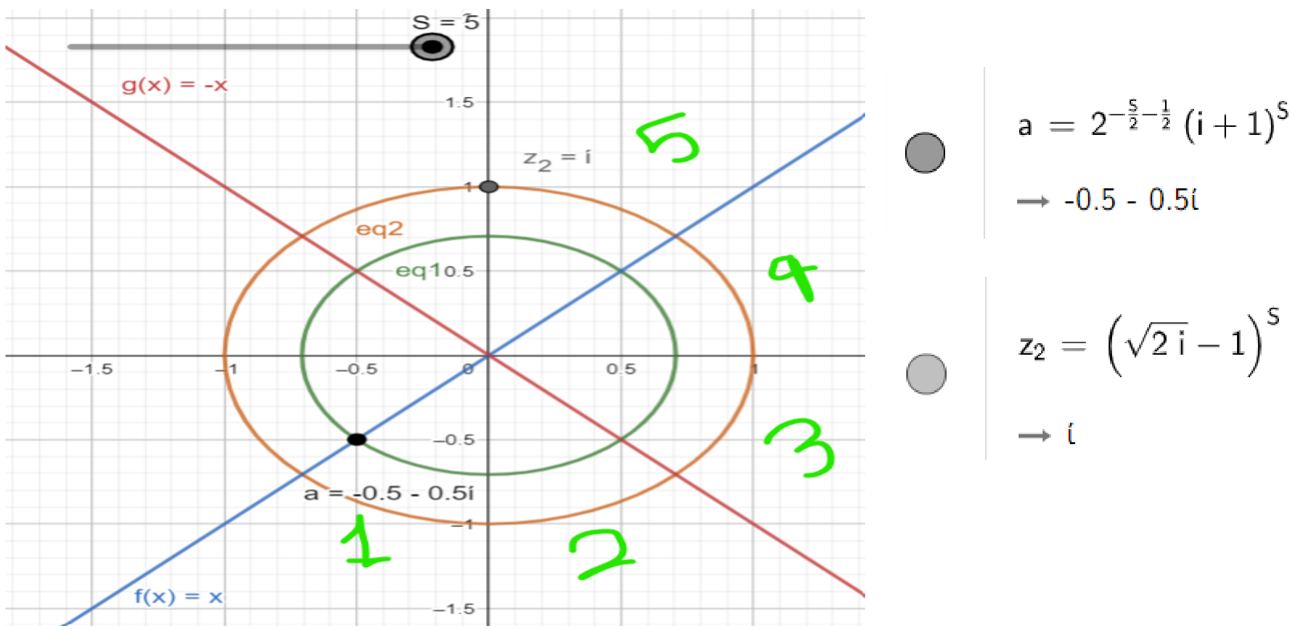


4- $both\ [i]\ AND\ \sqrt{2i}-1\ rotates\ with\ different\ rates\ as\ one\ uses\ [2i] and\ the\ other\ uses\ [i]$



For Example: - $\mathbf{2}^{\frac{-S}{2}-\frac{1}{2}}\,(\,\boldsymbol{i}+\mathbf{1})^{S}$ at S = 5 moves by 5 * 45

$\left(\sqrt{\mathbf{2}\boldsymbol{i}}-\mathbf{1}\right)^{\boldsymbol{S}}$ at S = 5 rotate by (2 * 5 * 45 degrees)



This rotation sequence depends only on if the power is odd or even and do not depend on any other parameter.

$$\left(\sqrt{\mathbf{2}\boldsymbol{i}}-\mathbf{1}\right)^{\boldsymbol{S}} = \begin{cases} \pm 1\,, for\ each\ S\ [even]\ Number \\ \pm i\,;\, for\ Each\ S\ [odd]\ Number \end{cases}$$

$$i^{\frac{S}{2}} * 2^{-\frac{S}{2}-1} * (1+i)^{S}$$

$$i^{\frac{S}{2}} * \ 2^{-\frac{S}{2}-1} * (1+i)^{S} = \begin{cases} \pm 1\,, for\ each\ S\ [even]\ Number \\ \pm i\,;\, for\ Each\ S\ [odd]\ Number \end{cases}$$

$$i^{\frac{S}{2}} * \ 2^{-\frac{S}{2}-\frac{1}{2}} * (1+i)^{S} = \begin{cases} \pm \dfrac{1}{2}\,, for\ each\ S\ [even]\ Number \\ \pm \dfrac{i}{2}\,;\, for\ Each\ S\ [odd]\ Number \end{cases}$$

3.1 Study power function with any base $\sqrt{A}$ using the field $\varphi(\sqrt{\ }\ ,\ \mathbf{i})$

In this section we are going to restrict our domain in this field to study this power function

$$\sqrt{A}^{(\sqrt{2i}-1)^S}\ ; where\ A\ and\ S\ any\ real\ number\ ; i\ is\ imaginary\ unit\ number$$

$$the\ approximation\ path\ for\ the\ rotation\ trace\ path\ for\ this\ function\ \sqrt{A}^{(\sqrt{2i}-1)^S}\ is$$

$$(x-\frac{1}{2}(\sqrt{A}+\frac{1}{\sqrt{A}}))^2+y^2=\frac{1}{4}\left(\sqrt{A}-\frac{1}{\sqrt{A}}\right)^2$$

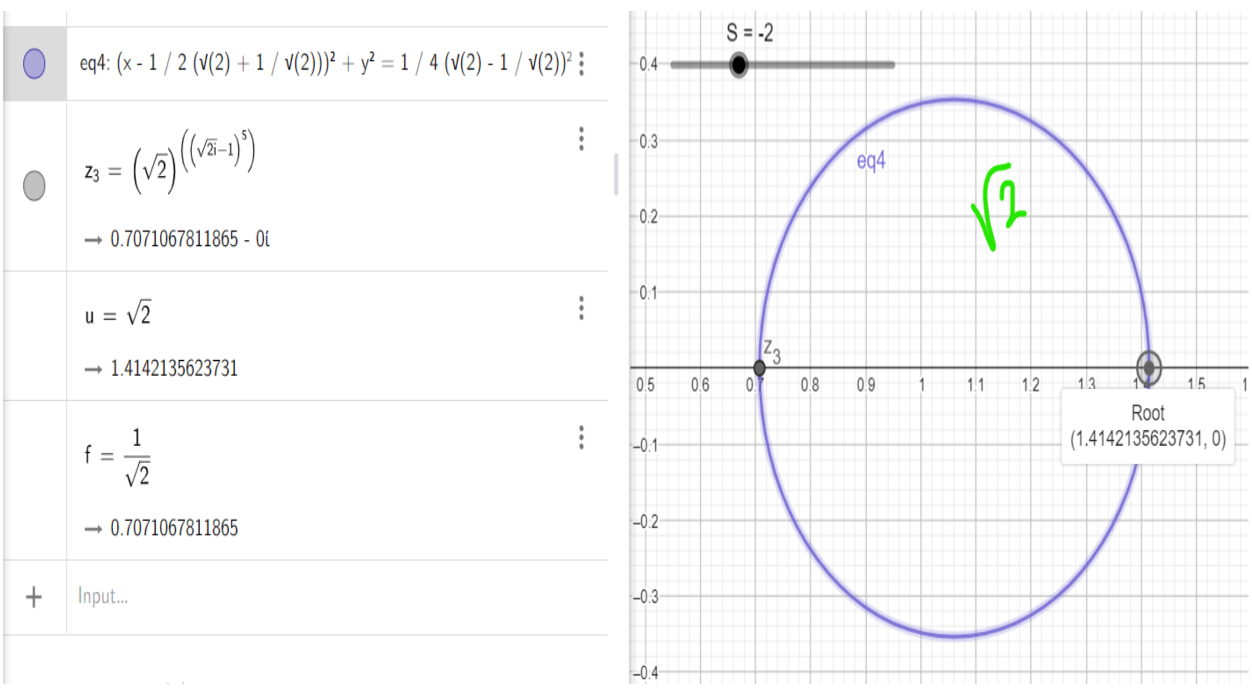
This trace path will have two zeros when y = 0

One at X = [$\sqrt{A}$] and [$\frac{1}{\sqrt{A}}$] for every [S] is an even natural number

$$\sqrt{A}^{(\sqrt{2i}-1)^S}=\begin{cases}[\sqrt{A}\,]\,, for\ each\ S\ [even]Number; S=\{2,4,6,8\ldots\}\\ \left[\frac{1}{\sqrt{A}}\right]; for\ Each\ S\ [even]\ Number;\ S=\{2,4,6,8\ldots\}\end{cases}$$

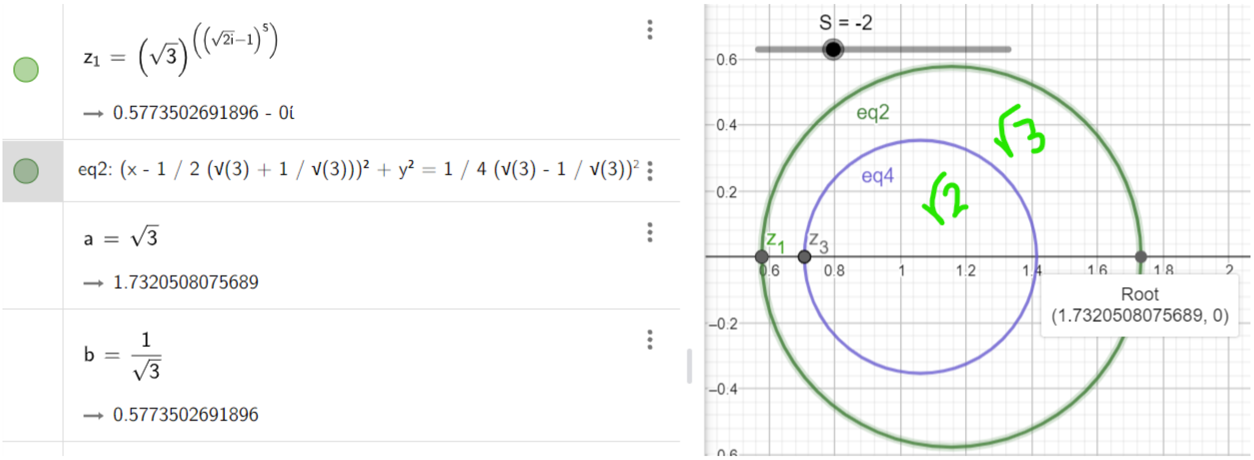
1) IF $\sqrt{A}=\sqrt{2}\,; THEN\ our\ base\ function\ is\ \sqrt{2}^{(\sqrt{2i}-1)^S}$

And our trace function (Circle in blue) is $(x-\frac{1}{2}(\sqrt{2}+\frac{1}{\sqrt{2}}))^2+y^2=\frac{1}{4}\left(\sqrt{2}-\frac{1}{\sqrt{2}}\right)^2$



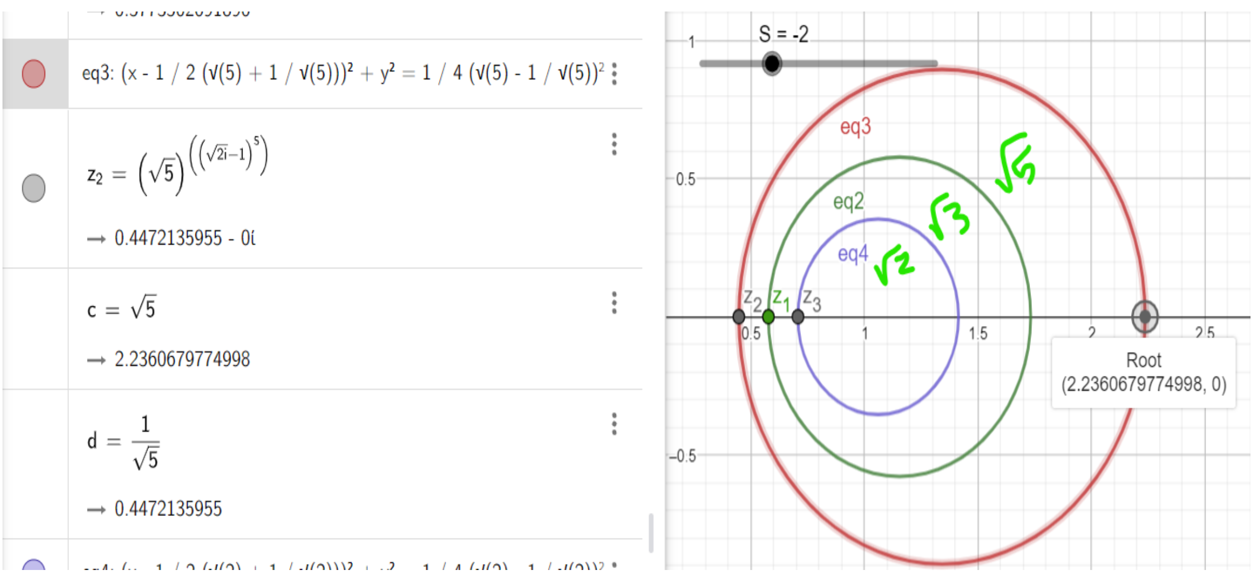
2) IF $\sqrt{A} = \sqrt{3}$; $THEN\ our\ base\ function\ is\ \sqrt{3}^{(\sqrt{2i}-1)^{S}}$

And our trace function (circle in green) is $(x - \frac{1}{2}(\sqrt{3} + \frac{1}{\sqrt{3}}))^2 + y^2 = \frac{1}{4}\left(\sqrt{3} - \frac{1}{\sqrt{3}}\right)^2$



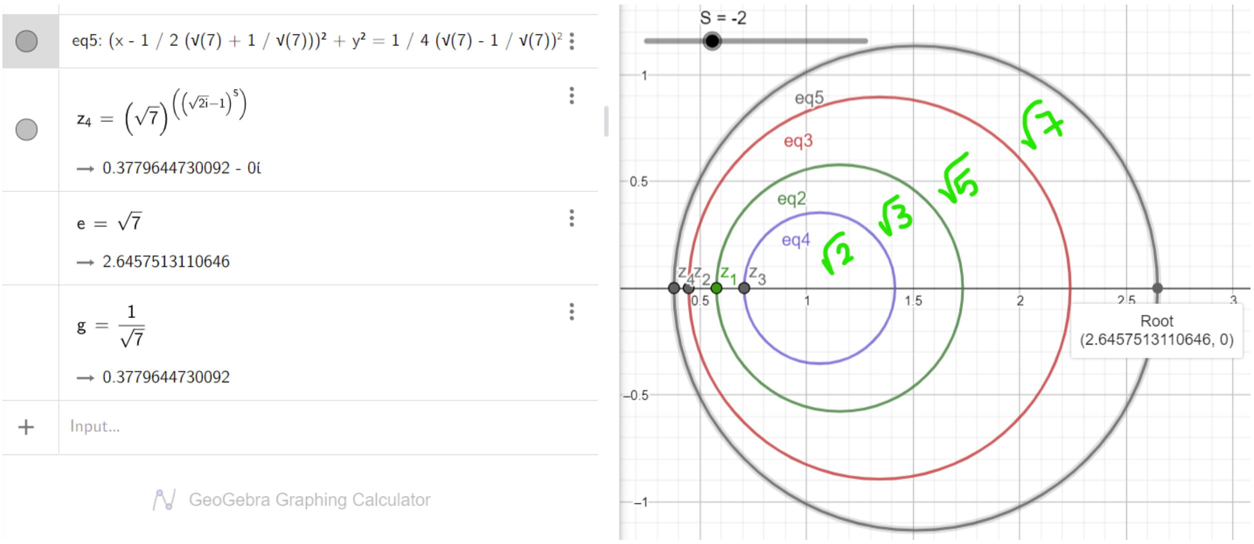
3) IF $\sqrt{A} = \sqrt{5}$; $THEN\ our\ base\ function\ is\ \sqrt{5}^{(\sqrt{2i}-1)^{S}}$

And its trace function (circle in red) is $(x - \frac{1}{2}(\sqrt{5} + \frac{1}{5}))^2 + y^2 = \frac{1}{4}\left(\sqrt{5} - \frac{1}{\sqrt{5}}\right)^2$



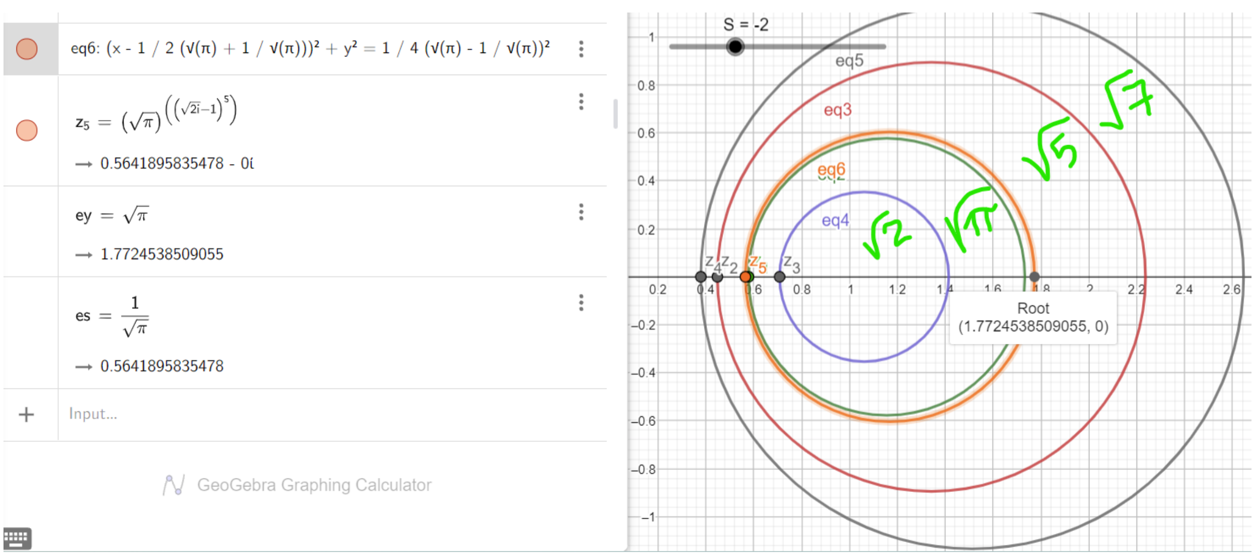
4) IF $\sqrt{A} = \sqrt{7}$; $THEN\ our\ base\ function\ is\ \sqrt{7}^{(\sqrt{2i}-1)^{S}}$

And its trace function (circle in gray) is $(x - \frac{1}{2}(\sqrt{7} + \frac{1}{\sqrt{7}}))^2 + y^2 = \frac{1}{4}\left(\sqrt{7} - \frac{1}{\sqrt{7}}\right)^2$



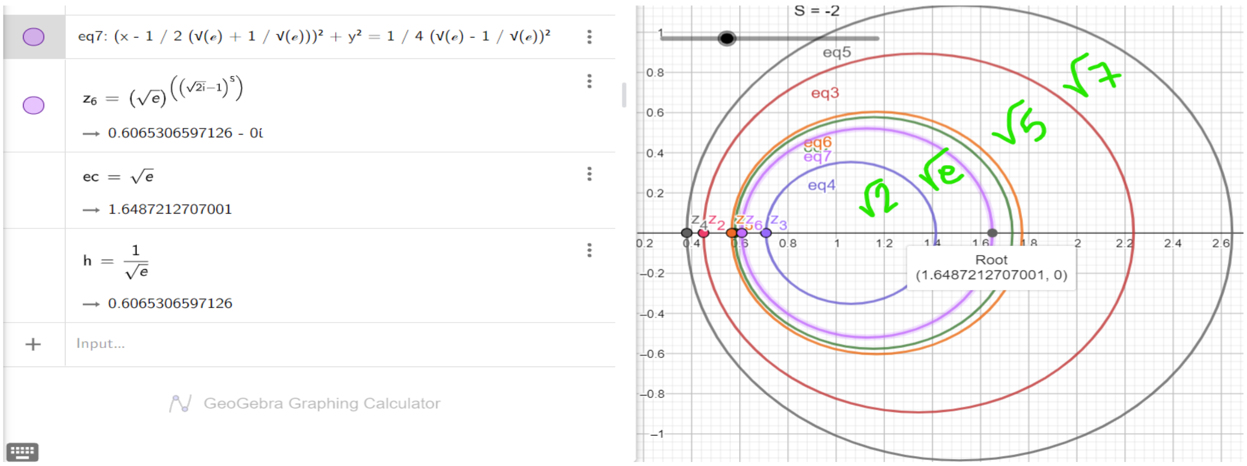
5) IF $[\sqrt{A} = \sqrt{\pi}\ ]$; $THEN\ our\ base\ function\ is\ \sqrt{\pi}^{(\sqrt{2i}-1)^{S}}$

And our trace function (orange circle) is $(x - \frac{1}{2}(\sqrt{\pi} + \frac{1}{\sqrt{\pi}}))^2 + y^2 = \frac{1}{4}\left(\sqrt{\pi} - \frac{1}{\sqrt{\pi}}\right)^2$

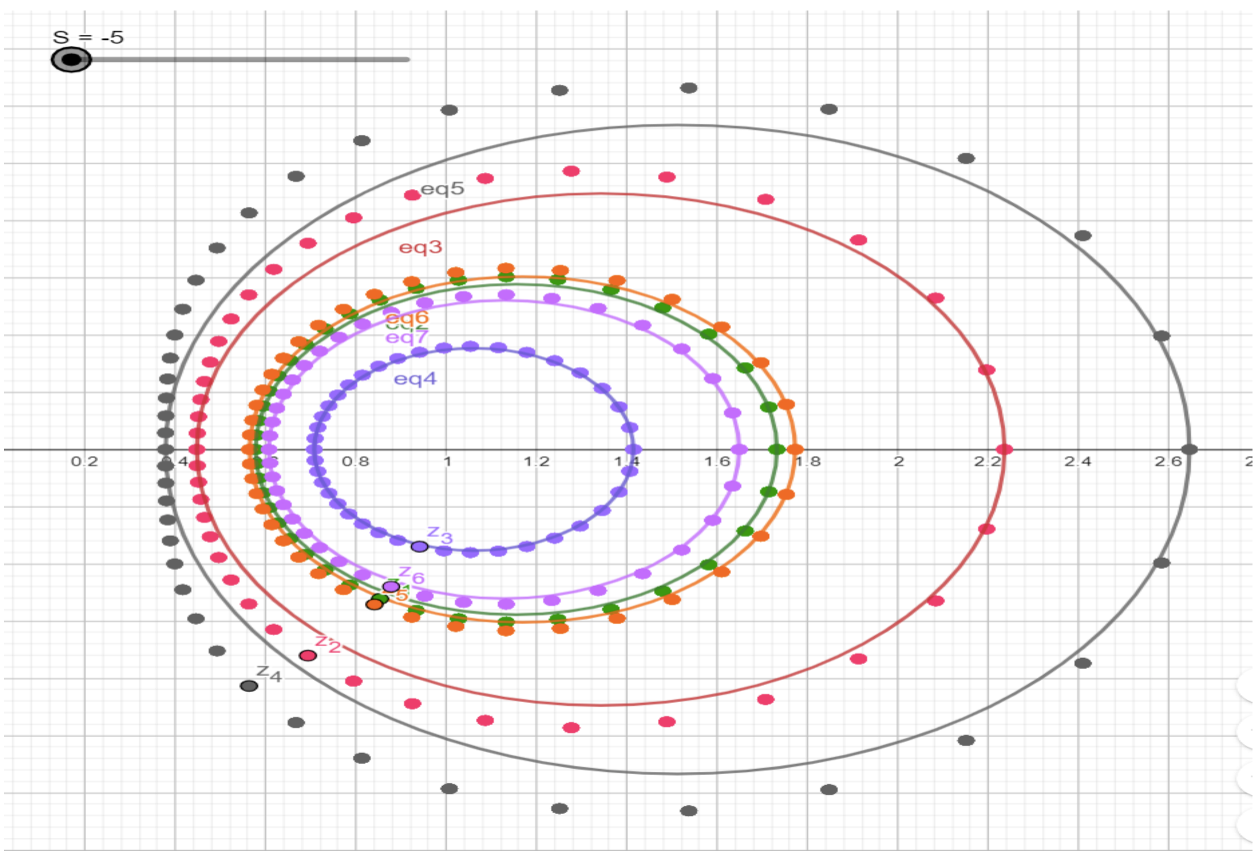


6) IF $[\sqrt{A} = \sqrt{e}\,]$; $THEN\ our\ base\ function\ is\ \sqrt{e}^{(\sqrt{2i}-1)^{S}}$

And our trace function is $(x - \frac{1}{2}(\sqrt{e} + \frac{1}{\sqrt{e}}))^2 + y^2 = \frac{1}{4}\left(\sqrt{e} - \frac{1}{\sqrt{e}}\right)^2$



7) Our power function $\sqrt{A}^{(\sqrt{2i}-1)^{S}}$ actual trace path is the dotted shapes (we only interested in Zero locations in this paper)



$$\sqrt{A}^{\left(\sqrt{2i}-1\right)^{S}} = A^{\frac{\left(\sqrt{2i}-1\right)^{S}}{2}}$$

$$A^{\frac{\left(\sqrt{2i}-1\right)^{S}}{2}} = \begin{cases} \frac{1}{\sqrt{A}};\ for\ any\ even\ value\ for\ S \\ \sqrt{A}\,;for\ any\ even\ value\ for\ S \\ \sim(x-\frac{1}{2}(\sqrt{A}+\frac{1}{\sqrt{A}}))^2+y^2=\frac{1}{4}\left(\sqrt{A}-\frac{1}{\sqrt{A}}\right)^2;\ for\ any\ Real\ value\ for\ S \end{cases}$$

3.2 Study Normalized power function with any base $\sqrt{A}$ using the field $\boldsymbol{\varphi}(\sqrt{\ \ }\ ,\ \mathbf{i})$

To Normalize $\sqrt{A}$ to A we need to multiply by $\sqrt{A}$
which will be represented on the power by adding $\frac{1}{2}$ to the power.

So, the normalized form will be.

$$\sqrt{A} * \sqrt{A}^{\left(\sqrt{2i}-1\right)^{S}} = A^{\frac{\left(\sqrt{2i}-1\right)^{S}}{2}+\frac{1}{2}}$$

$$A^{\frac{\left(\sqrt{2i}-1\right)^{S}}{2}+\frac{1}{2}} = \begin{cases} 1;\ for\ any\ even\ value\ for\ S \\ A\,;for\ any\ even\ value\ for\ S \\ \sim(x-\frac{1}{2}(A+\frac{1}{A}))^2+y^2=\frac{1}{4}\left(A-\frac{1}{A}\right)^2;\ for\ any\ Real\ value\ for\ S \end{cases}$$

And we get the Zero of $\frac{1}{\sqrt{A}}$ from the imaginary unit number sign change property

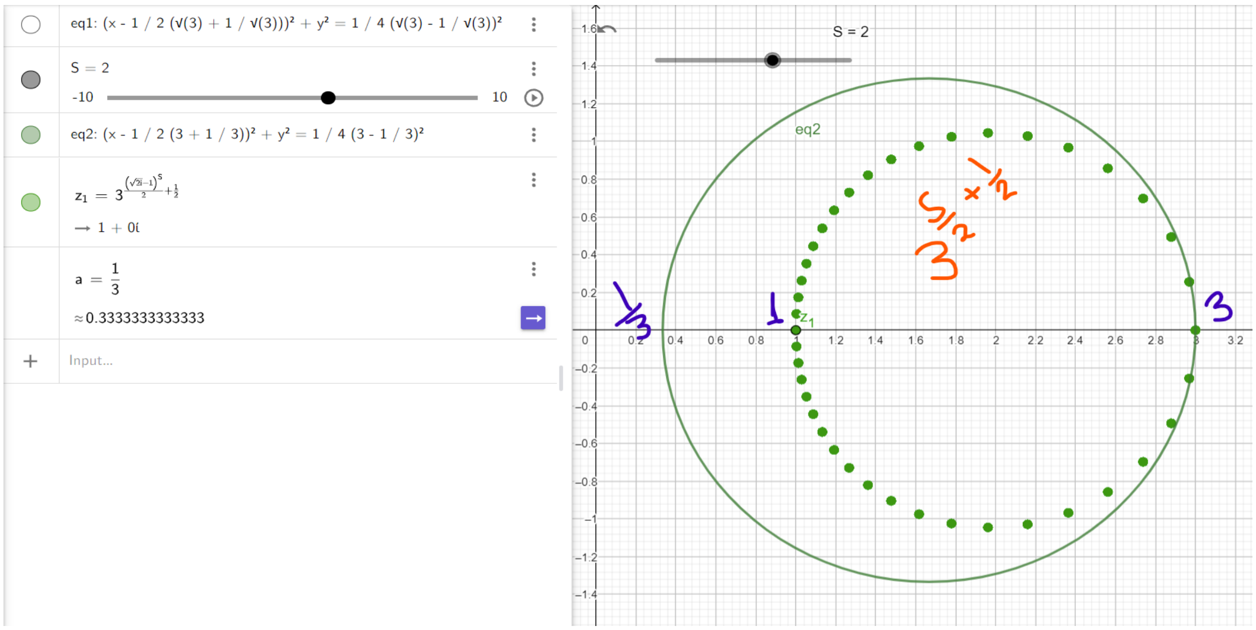
$$\frac{1}{i} = -1i$$

And as long as [i] will be in the power not in the base of power function so we can get reciprocal Zero as well.

8) IF $[A = 3]$ then our Normalized power function is $3^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$

And our approximation trace function is $(x - \frac{1}{2}(3 + \frac{1}{3}))^2 + y^2 = \frac{1}{4}\left(3 - \frac{1}{3}\right)^2$

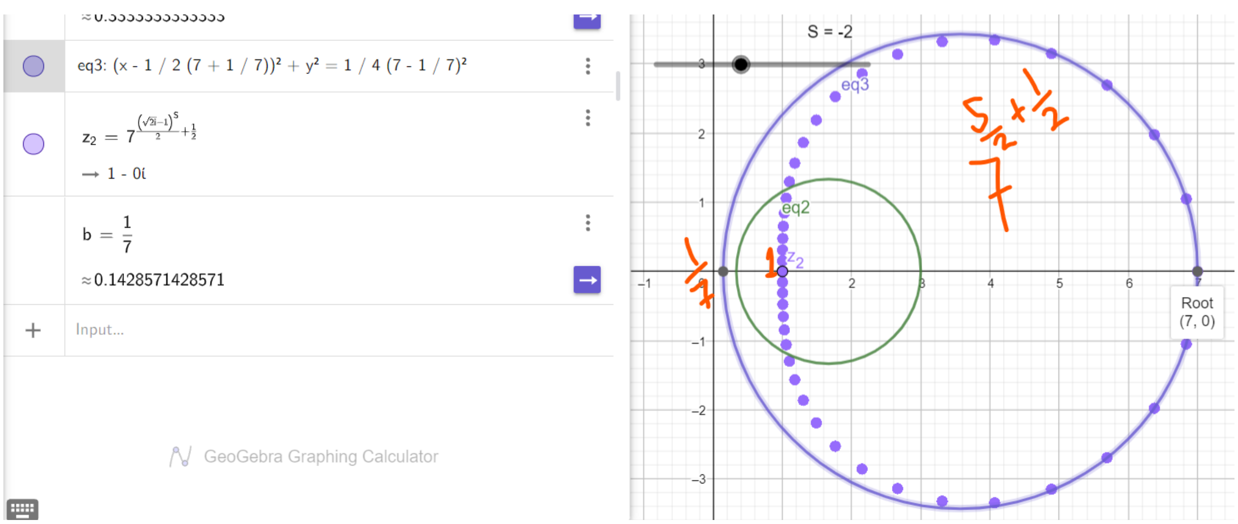
dotted elliptical shape is the trace for the powerfunction $3^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$
only has Zeros at 1 *and at* 3



9) If $[A = 7]$ then our Normalized power function is $7^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$

And our approximation trace function is $(x - \frac{1}{2}(7 + \frac{1}{7}))^2 + y^2 = \frac{1}{4}\left(7 - \frac{1}{7}\right)^2$

dotted elliptical shape is the trace for the powerfunction $7^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$
only has Zeros at 1 *and at* 7

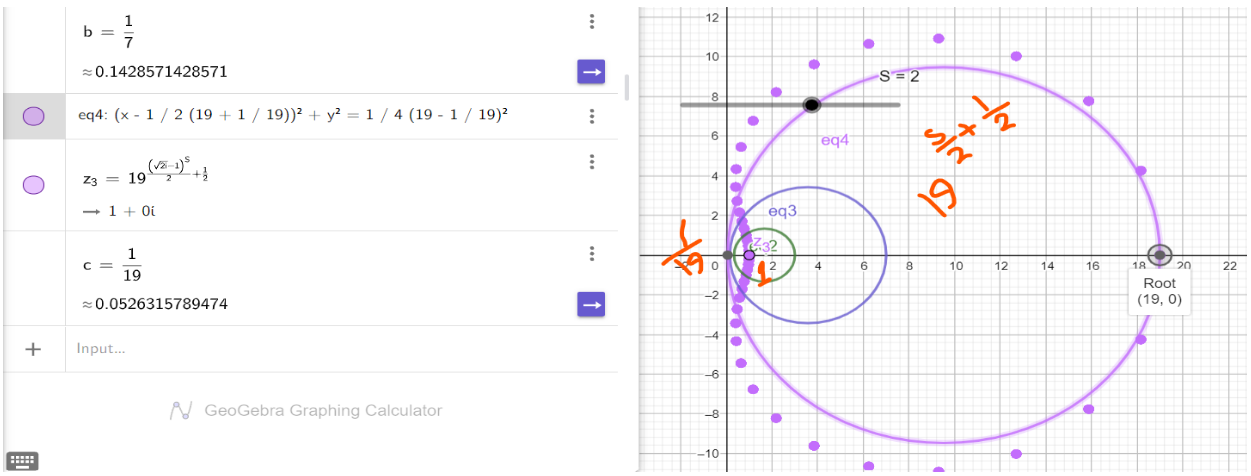


10) IF [$A = 19$] Then our normalized function is $19^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$

And our approximation trace function is $(x-\frac{1}{2}(19+\frac{1}{19}))^2+y^2=\frac{1}{4}\left(19-\frac{1}{19}\right)^2$

dotted elliptical shape is the trace for the powerfunction $19^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$

only has Zeros at 1 and at 19

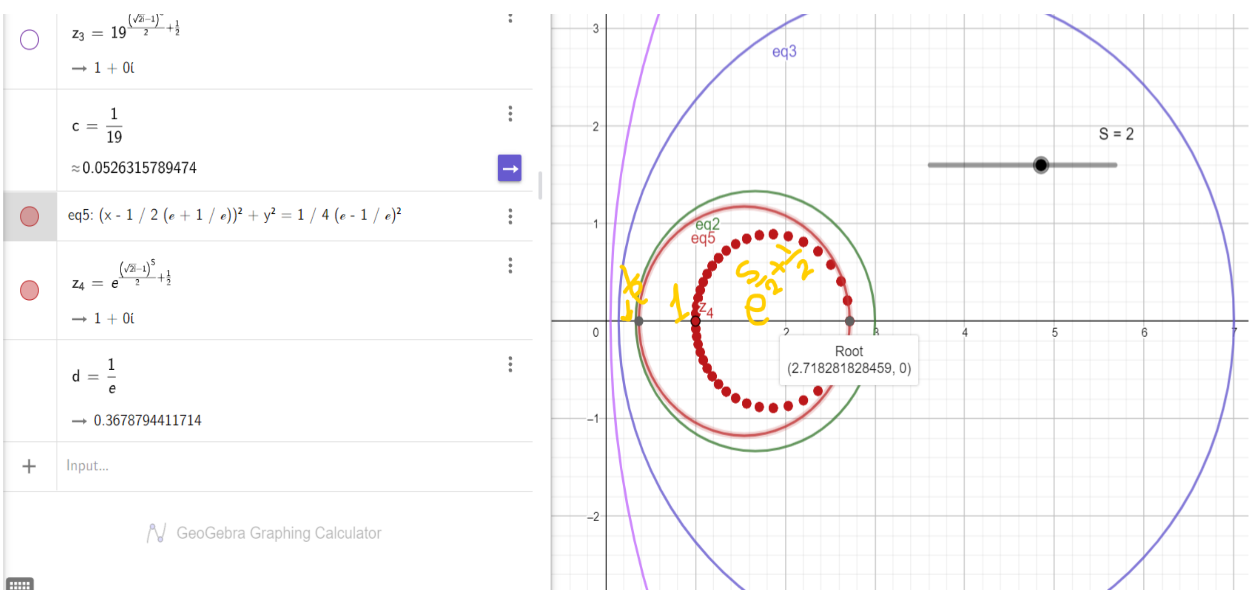


11) If [$A = e$] Then our normalized function is $e^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$

And our approximation trace function is $(x-\frac{1}{2}(e+\frac{1}{e}))^2+y^2=\frac{1}{4}\left(e-\frac{1}{e}\right)^2$

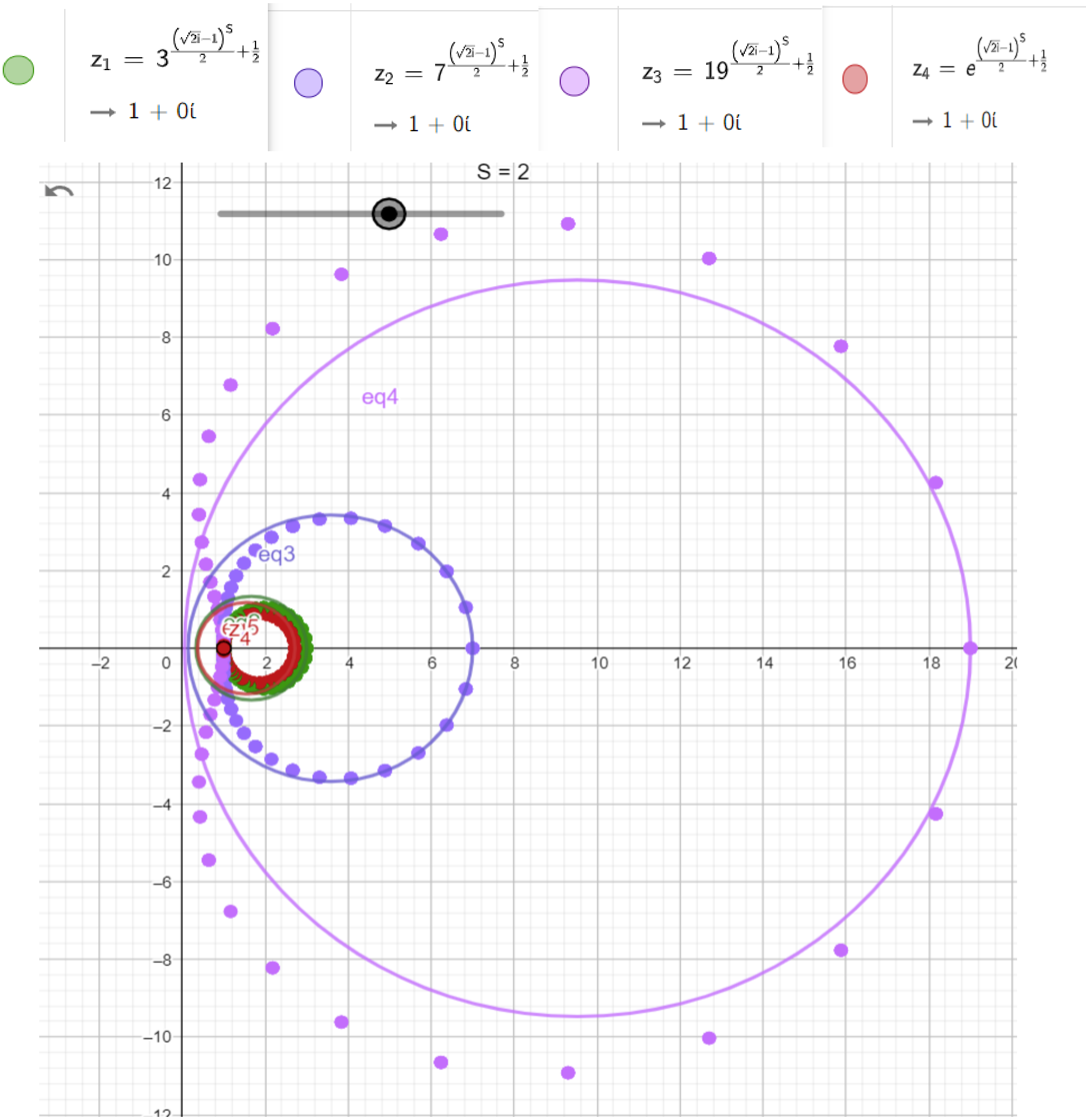
dotted elliptical shape is the trace for the powerfunction $e^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}}$

only has Zeros at 1 and at e



This Section conclusion is for any normalized power function with base [A] [choose of [A] value and real number] will have two zeros for This function one at [1] and another zero at the base [A].

$$e^{\frac{(\sqrt{2i}-1)^{S}}{2}+\frac{1}{2}}\text{ ; } will\ have\ two\ Zeros\ one\ at\ [e]\ and\ at\ [1]; we\ already\ saw\ that\ \boldsymbol{i} = \sqrt{\boldsymbol{2i}} - \mathbf{1}$$



4.1 Study Normalized power function in a field $\varphi(\sqrt{\ }\ ,\ \mathbf{i}\,, \mathbf{e})$

In this field domain we are going to study this power function

$$e^{\frac{(\sqrt{2i}-1)^S}{2}+\frac{1}{2}} = e^{\frac{i^S}{2}+\frac{1}{2}}$$

$$where\ as\ we\ explianed\ in\ previous\ two\ sections$$
$$+\frac{1}{2}\ in\ the\ power\ is\ comming\ from\ the\ normalization\ due\ to\ multiplication\ by\ \sqrt{\ }$$

$$and\ \frac{1}{2}\ in\ \frac{(\sqrt{2i}-1)^S}{2} is\ from\ the\ orignal\ root\ in\ the\ original\ power\ function$$

Now we proofed that this power function has two Zeros [1], [A]

In Zeta function formula to visualize none-trivial zeros in the interval [0,1] a technique was done called "analytical continuity" which in summary was a multiplication by $\frac{1}{2}$

Therefore, we are going to do what the Analytical continuity did to zeta function in summary it divided the calculations by [2]

THEN our Normalized power function now is $\frac{1}{2} * e^{\frac{i^S}{2}+\frac{1}{2}}$

THEN now we will have Zeros at $\frac{1}{2}$ and $\frac{A}{2}$

$$\frac{1}{2} * e^{\frac{i^S}{2}+\frac{1}{2}} = \begin{cases} \frac{1}{2};\ for\ any\ even\ value\ for\ S \\ \frac{A}{2}\ ; for\ any\ even\ value\ for\ S \\ \sim(x-\frac{1}{2}(A+\frac{1}{A}))^2 + y^2 = \frac{1}{4}\left(A-\frac{1}{A}\right)^2;\ for\ any\ Real\ value\ for\ S \end{cases}$$

As this domain is already its odd powers lagged by 45 degrees from the normal complex plane. Then this domain also its odd powers is lagged 45 degrees also so in total this domain odd powers is lagged by [90 degrees] from normal complex plane

To rotate the odd numbers axis by [90 degrees] we can do it by two ways.

1 – let S = S +1; but we can not do this because this will switch us from odd power to even power again

2- use π in the power so $\frac{i^S}{2}\ will\ be\ come \frac{\pi}{2} * i^S; which\ will\ give\ us\ these\ 90\ degrees\ needed$

As we in this section we only study field domain without π, then we are going to get around this by using revers operations. By shifting towards imaginary axis.

$$\frac{i^S}{2} = \begin{cases} \pm\frac{1}{2} \text{ ; } when\ S\ is\ even\ natural\ number \\ +\frac{i}{2} \text{ ; } when\ S\ is\ odd\ \{\ldots, 13, 9, 5, 1, -3, -7, -11, ..\} \\ -\frac{i}{2} \text{ ; } when\ S\ is\ odd\ \{.., 11, 7, 3, -1, -5, -9, -13, ..\} \\ \pm\frac{a}{2} \pm \frac{b}{2} i \text{ ; } when\ S\ is\ a\ Real\ number \end{cases}$$

$$\frac{1}{2} * e^{\frac{i^S}{2}+\frac{1}{2}}\ can\ be\ also\ with\ \left[-\frac{1}{2}\right]\ so\ we\ can\ divide\ by\ [e]$$

$$\frac{1}{2e}\ (e^{\frac{i^S}{2}} - e^{\frac{i}{2}})$$

$$= \begin{cases} 0\ ;\ for\ any\ odd\ values\ for\ S\ where\ \frac{i^S}{2} = +\frac{i}{2} \\ \frac{1}{2e}\left(\frac{1}{\sqrt{e}^i} - \sqrt{e}^i\right) = -0.176370799225 * i;\ for\ any\ odd\ values\ for\ S\ where\ \frac{i^S}{2} = -\frac{i}{2} \\ \sim(x - \frac{1}{2}(A + \frac{1}{A}))^2 + y^2 = \frac{1}{4}\left(A - \frac{1}{A}\right)^2\ ;\ for\ any\ Real\ value\ for\ S \end{cases}$$

$$\frac{1}{2}\ (e^{\frac{i^S}{2}} - e^{\frac{i}{2}}) = \begin{cases} 0\ ;\ for\ any\ odd\ values\ for\ S\ where\ \frac{i^S}{2} = +\frac{i}{2} \\ \frac{1}{2}\left(\frac{1}{\sqrt{e}^i} - \sqrt{e}^i\right) = \frac{1}{2}\left(\frac{1 - e^i}{\sqrt{e}^i}\right);\ for\ any\ odd\ values\ for\ S\ where\ \frac{i^S}{2} = -\frac{i}{2} \\ \sim(x - \frac{1}{2}(A + \frac{1}{A}))^2 + y^2 = \frac{1}{4}\left(A - \frac{1}{A}\right)^2\ ;\ for\ any\ Real\ value\ for\ S \end{cases}$$

$$\sin x = \frac{e^{ix} - e^{-ix}}{2i}$$

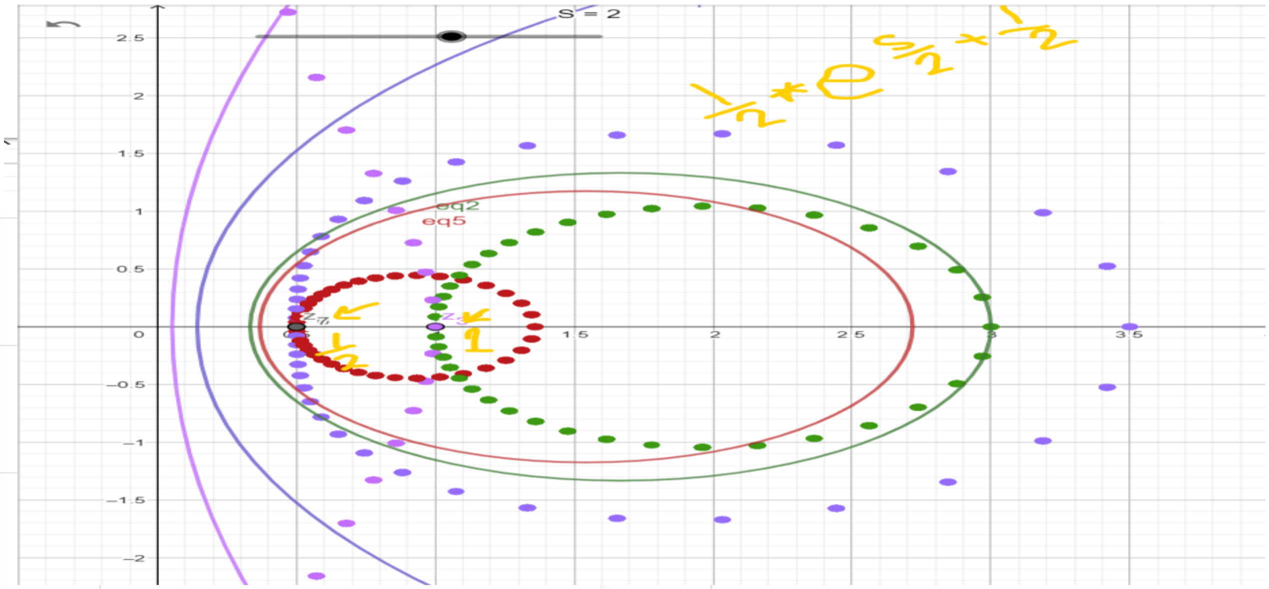
X =0.5 radian

$$\frac{1}{2}\left(\frac{1}{\sqrt{e}^i} - \sqrt{e}^i\right) = \frac{e^{-\frac{i}{2}} - e^{\frac{i}{2}}}{2} = \frac{2 * i * \sin(0.5)}{2} = i \sin(0.5)\ \ for\ any\ odd\ values\ for\ S\ and\ \frac{i^S}{2} = -\frac{i}{2}$$

$$\text{as } \pi = 180 \text{ degrees THEN} \frac{\pi}{2} = 90\ ;\ \sin(90) = 1\ and\ \cos(90) = 0$$

So even if we added π to this function $\frac{1}{2}\ (e^{\frac{i^S}{2}} - e^{\frac{i}{2}})$ in this field domain then θ = 90. We will see π in the next field domain.

and this step Proofs Riemann hypothesis that say all prime numbers have only imaginary part for any power.



$z_7 = \frac{1}{2} \cdot 3^{\frac{(\sqrt{2}i-1)^S}{2}+\frac{1}{2}}$

$\longrightarrow$ 0.5 - 0ί

$z_7 = \frac{1}{2} \cdot 3^{\frac{(\sqrt{2}i-1)^S}{2}+\frac{1}{2}}$

$\longrightarrow$ 1.5 + 0ί

$z_5 = i^7$ $\longrightarrow$ 0 - ί	$z_5 = i^2$ $\longrightarrow$ -1 + 0ί
$z_{10} = i^3$ $\longrightarrow$ -1ί	$z_{10} = i^4$ $\longrightarrow$ 1 + 0ί
$z_{11} = i^5$ $\longrightarrow$ ί	$z_{11} = i^6$ $\longrightarrow$ -1 + 0ί
$z_{12} = i^9$ $\longrightarrow$ 0 + ί	$z_{12} = i^8$ $\longrightarrow$ 1 - 0ί

5.1 Study Normalized power function in a field $\varphi(\sqrt{\ }\ ,\ \mathbf{i}\,,\mathbf{e}\,,\boldsymbol{\pi})$

In this field domain we are going to study this power function

$$e^{\frac{\pi * i^S}{2}+\frac{1}{2}}$$

π has two meaning one is radian meaning and one is the degree of the vector that represent the complex number. $\pi = 180\ and\ \pi \sim 3.14$

To summaries

Approximation trace function for square root domain is.

$$(x - \frac{1}{2}(\sqrt{e} + \frac{1}{\sqrt{e}}))^2 + y^2 = \frac{1}{4}\left(\sqrt{e} - \frac{1}{\sqrt{e}}\right)^2$$

Approximation trace function for Normal complex plane domain is.

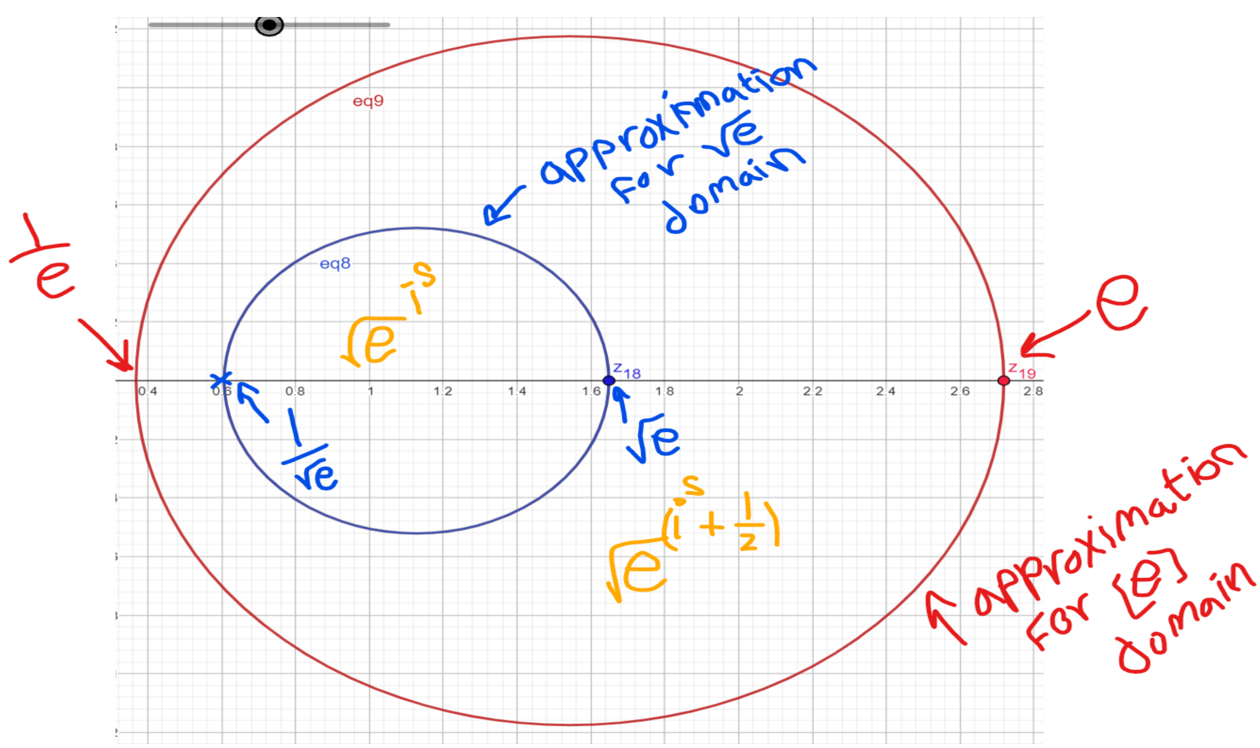
$$(x - \frac{1}{2}(e + \frac{1}{e}))^2 + y^2 = \frac{1}{4}\left(e - \frac{1}{e}\right)^2$$

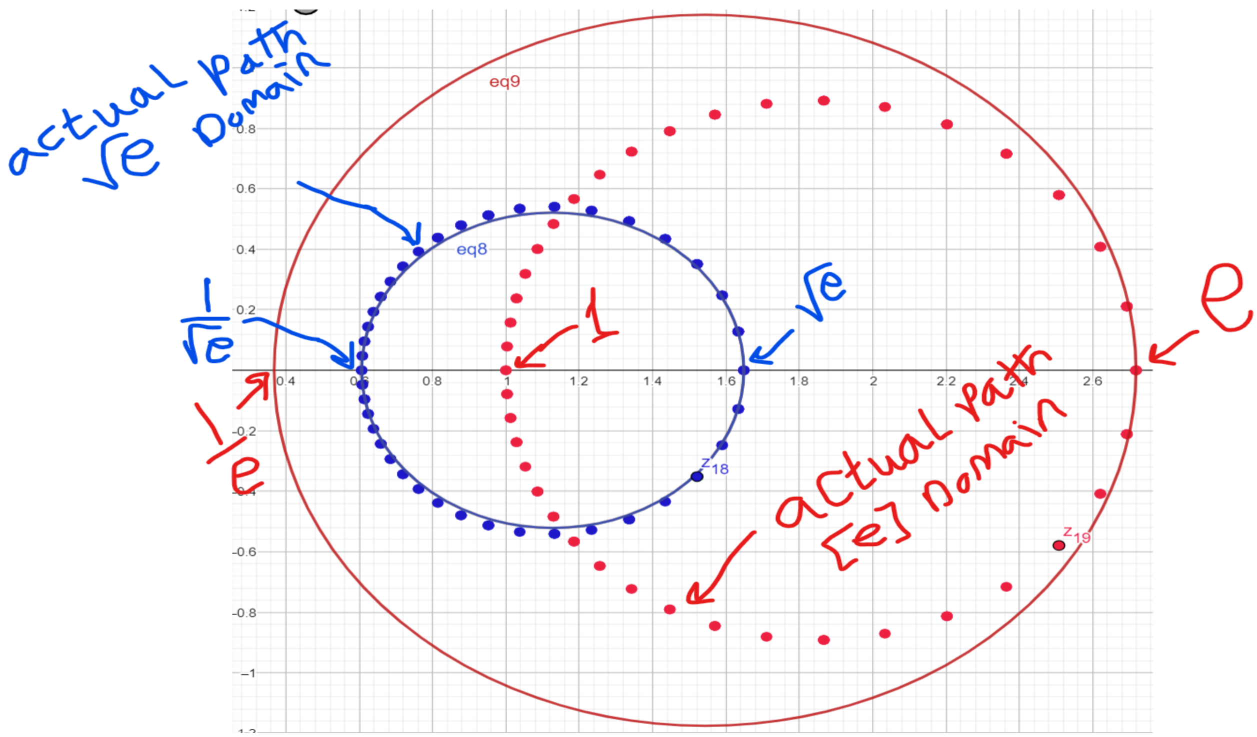
Power function form square root domain is.

$$\sqrt{e}^{\pi * i^S} = \mathbf{e}^{\frac{\pi * i^S}{2}}$$

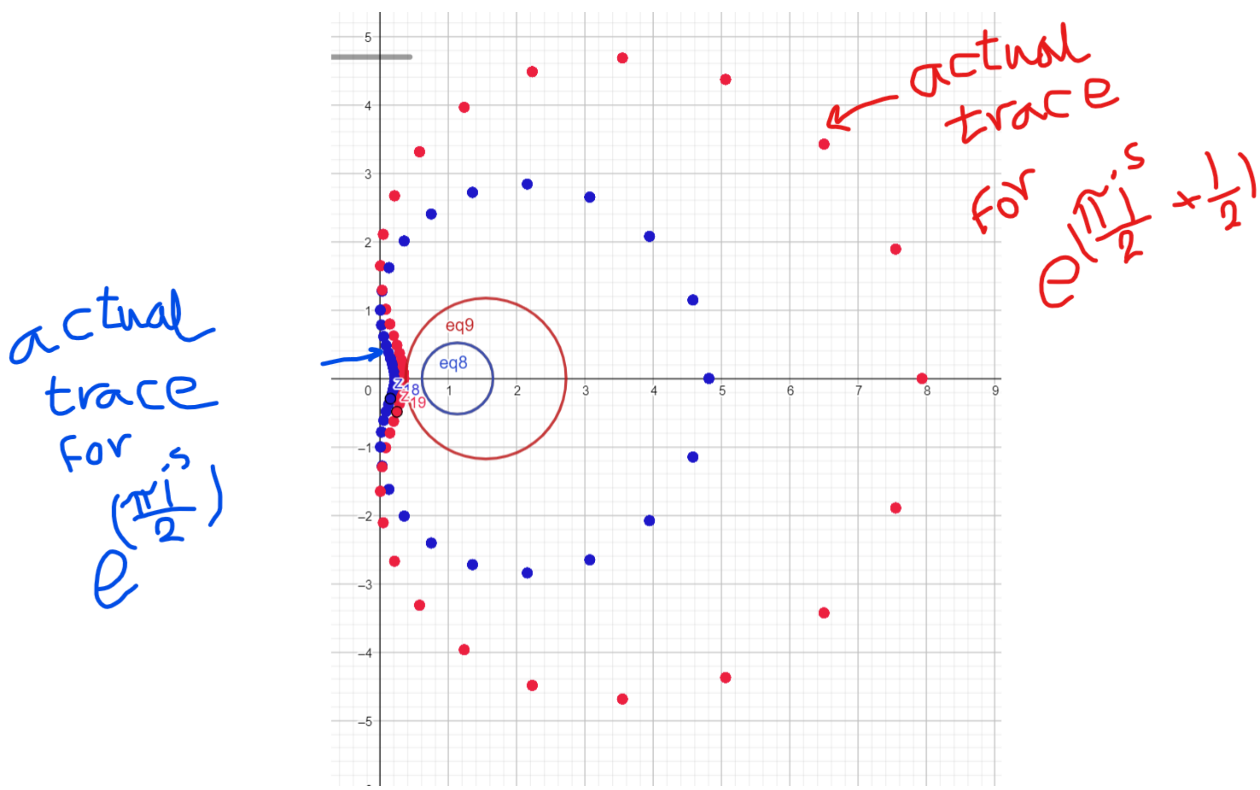
Power function form normal complex plane domain is.

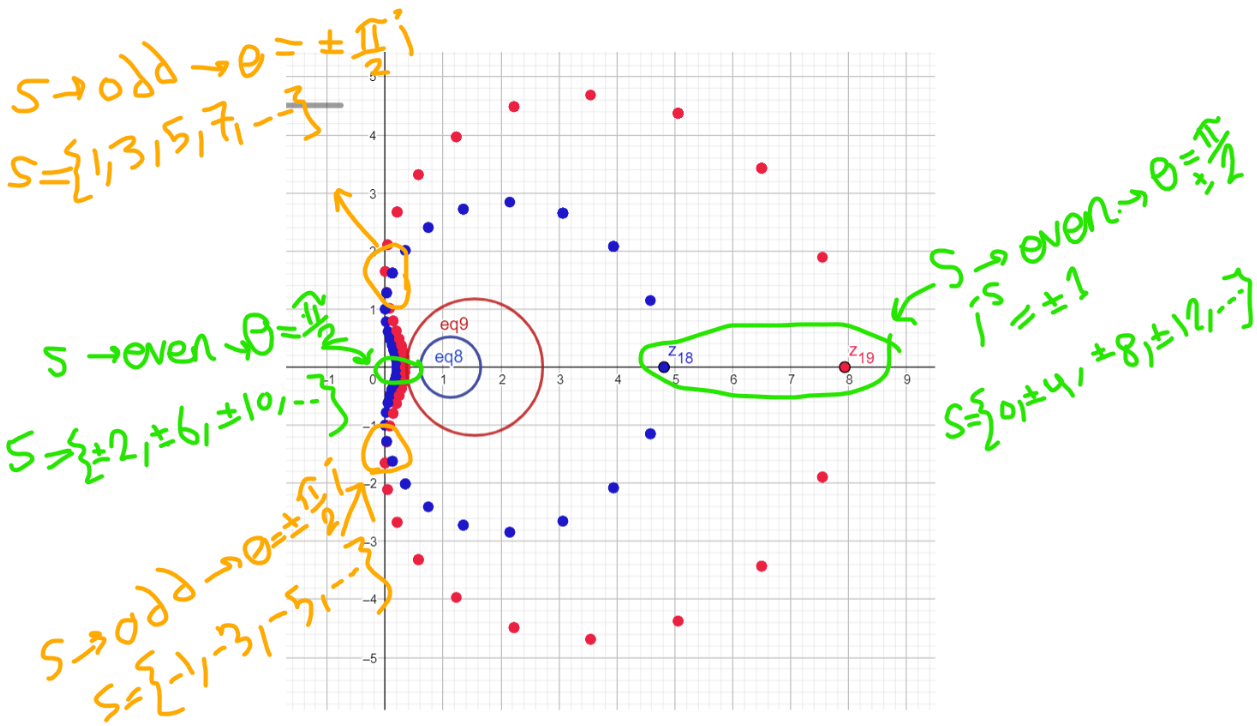
$$\sqrt{e}^{\pi * i^S + \frac{1}{2}} = \mathbf{e}^{\frac{\pi * i^S}{2}+\frac{1}{2}}$$



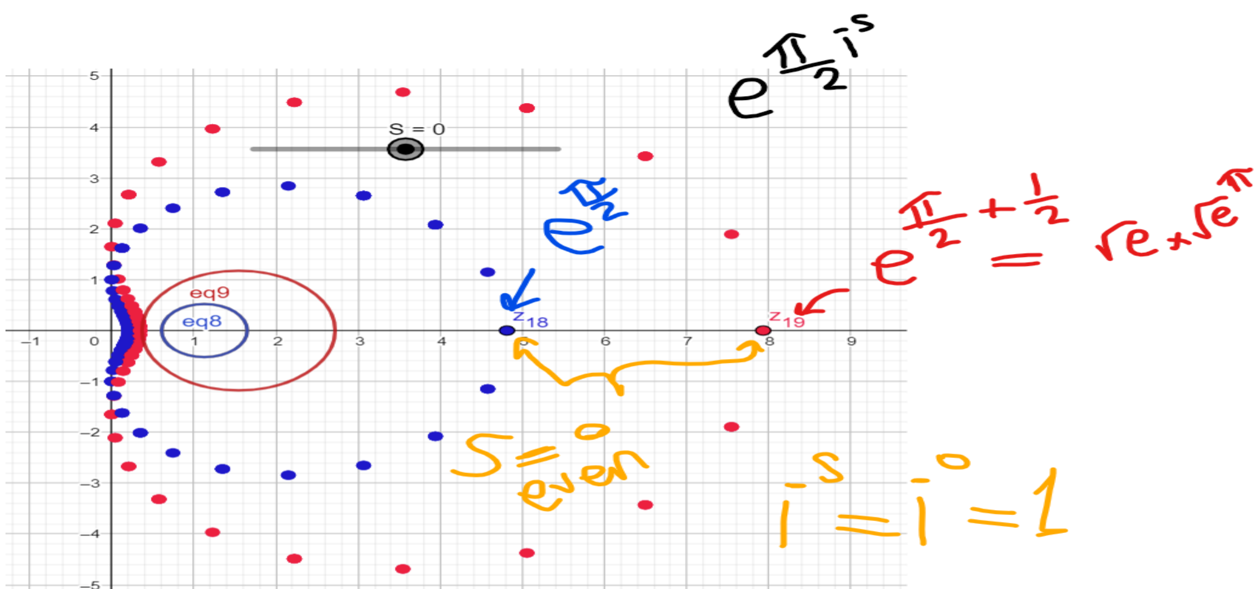


adding π in the power will be visualized using the radian value 3.14 which in the power will increase the actual path size almost 3 times as you see the difference between the sizes with and without π.

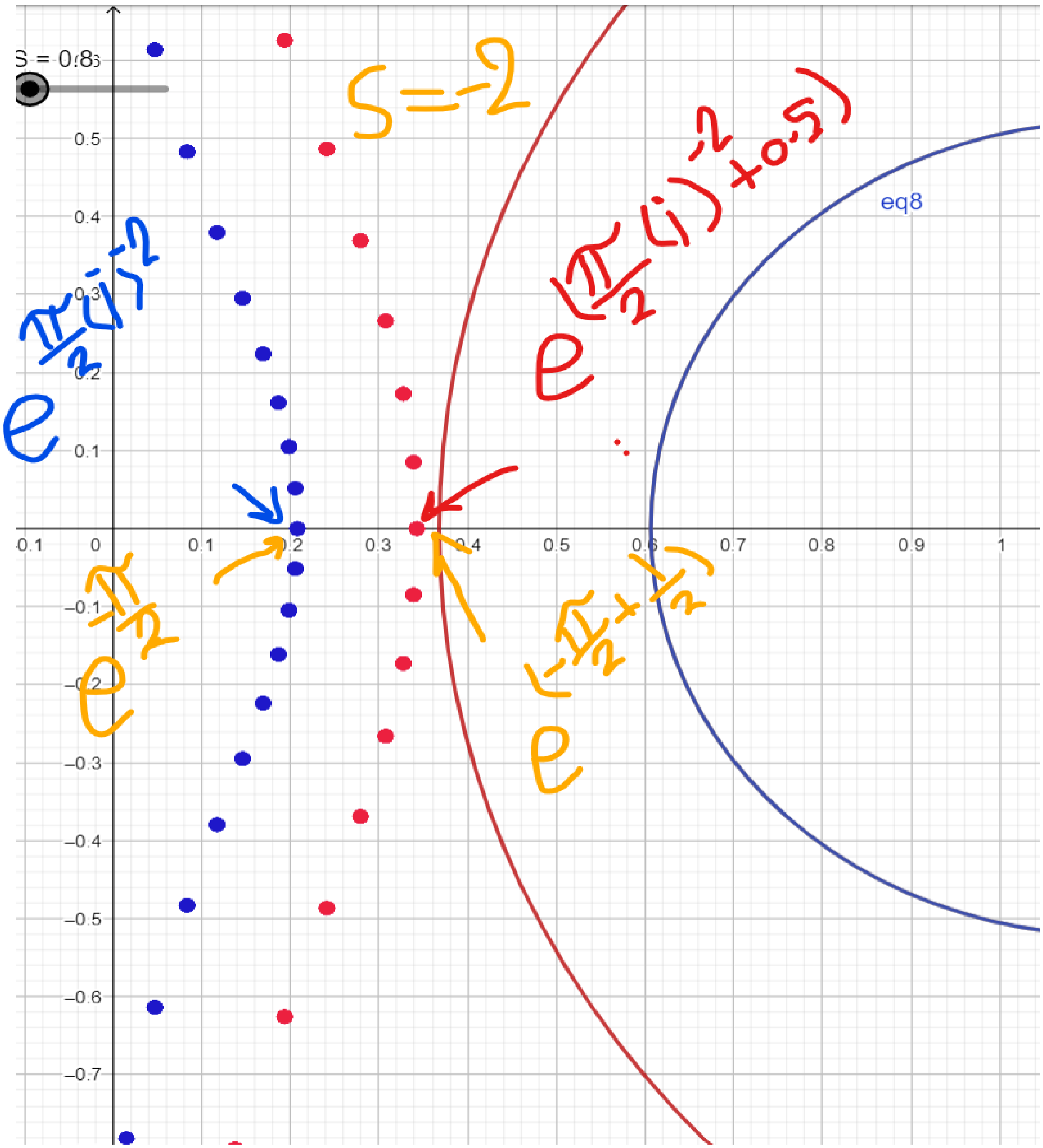




eq9
eq8
z18
z19
S → odd → θ = ± π/2 i
S = {1, 3, 5, 7, ...}
S → even → θ = ± π/2
S → {±2, ±6, ±10, ...}
S → odd → θ = ± π/2 i
S = {-1, -3, -5, ...}
S → even → θ = ± π/2
i^-S = ±1
S = {0, ±4, ±8, ±12, ...}



S = 0
eq9
eq8
z18
z19
e^(π/2 i^-S)
e^(π/2)
e^(π/2 + 1/2) = √e × √e^π
S = 0 even
i^-S = i^0 = 1



S = 0.83
eq8
S=-2

To summarize this point in this field domain we used normalized power function.

$$e^{\frac{\pi * i^S}{2}+\frac{1}{2}}$$

IF

$$(i)^S = \begin{cases} 1\,; when\ S\ is\ even = \{0,4,8,12,\dots\} \\ -1\,; when\ S\ is\ even = \{2,6,10,14,\dots\} \\ +i\,; when\ S\ is\ odd = \{\dots,-11,-7,-3,1,5,9,13,\dots\} \\ -i\,; when\ S\ is\ odd = \{\dots,-9,-5,-1,3,7,11,15,..\} \\ \pm a \pm bi\,; when\ S\ is\ a\ Real\ number \end{cases}$$

AND

$$\text{as } \pi = 180 \text{ degrees THEN} \frac{\pi}{2} = 90\,;\ \sin(90) = 1\ and \cos(90) = 0$$

THEN

$$e^{\frac{\pi * i^S}{2}+\frac{1}{2}} = \begin{cases} e^{\frac{\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{0,4,8,12,\dots\} \\ e^{\frac{-\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{2,6,10,14,\dots\} \\ e^{\frac{\pi * i}{2}+\frac{1}{2}}\,; when\ S\ is\ odd = \{1,5,9,13,\dots\} \\ e^{\frac{-\pi * i}{2}+\frac{1}{2}}\,; when\ S\ is\ odd = \{3,7,11,15,..\} \\ e^{\frac{\pi*(\pm a \pm bi)}{2}+\frac{1}{2}}; when\ S\ , a, b\ are\ Real\ numbers \end{cases}$$

$$e^{\frac{\pi * i^S}{2}+\frac{1}{2}} = \begin{cases} e^{\frac{\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{0,4,8,12,\dots\} \\ e^{\frac{-\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{2,6,10,14,\dots\} \\ \sqrt{e} * (e^{\frac{\pi * i}{2}})\,; when\ S\ is\ odd = \{1,5,9,13,\dots\} \\ \sqrt{e} * (e^{\frac{-\pi * i}{2}})\,; when\ S\ is\ odd = \{3,7,11,15,..\} \\ e^{\frac{\pi*(\pm a \pm bi)}{2}+\frac{1}{2}}; when\ S, a, b\ are\ Real\ numbers \end{cases}$$

$$e^{\frac{\pi * i^S}{2}+\frac{1}{2}} = \begin{cases} e^{\frac{\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{0,4,8,12,\dots\} \\ e^{\frac{-\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{2,6,10,14,\dots\} \\ \sqrt{e} * (Cos\left(\frac{\pi}{2}\right) + i\ Sin\left(\frac{\pi}{2}\right))\,; when\ S\ is\ odd = \{1,5,9,13,\dots\} \\ -1 * \sqrt{e} * (Cos\left(\frac{\pi}{2}\right) + i\ Sin\left(\frac{\pi}{2}\right))\,; when\ S\ is\ odd = \{3,7,11,15,..\} \\ \sqrt{e} * \left(\pm Cos\left(a * \frac{\pi}{2}\right) \pm i\ Sin\left(b * \frac{\pi}{2}\right)\right); when\ S, a\ , b\ are\ Real\ numbers \end{cases}$$

$$e^{\frac{\pi * i^S}{2}+\frac{1}{2}} = \begin{cases} e^{\frac{\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{0,4,8,12,\dots\} \\ e^{\frac{-\pi}{2}+\frac{1}{2}}\,; when\ S\ is\ even = \{2,6,10,14,\dots\} \\ \sqrt{e} * i\ \ ; when\ S\ is\ odd = \{1,5,9,13,\dots\} \\ -1 * \sqrt{e} * i\,; when\ S\ is\ odd = \{3,7,11,15,..\} \\ \sqrt{e} * \left(\pm Cos\left(a * \frac{\pi}{2}\right) \pm i\ Sin\left(b * \frac{\pi}{2}\right)\right); when\ S, a, b\ are\ Real\ numbers \end{cases}$$

By this section and section (4.1) Study Normalized power function in a field $\boldsymbol{\varphi}(\sqrt{\ \ }\ ,\ \mathbf{i}\,,\mathbf{e})$
And this concludes our Proof for Riemann hypothesis.

3. Results

In This paper we studied the power function first in a small field $\varphi(\,i\,)$; a filed that includes mainly the imaginary number $[\,i\,]$.during this step we got through the complex plane imaginary axis is a projection for the square roots of all natural numbers. Then we increased our field domain for the power function to include [e] and studied the new field $\varphi(\,i\ \,,e)$. We also got through some number distributions using complex numbers and complex plane.

Then we increased our field domain for the power function again to include $[\pi]$ and studied the new field $\varphi(\,i\ \,,e\,,\pi)$. Using these fields breakdown, we proofed Riemann hypothesis that says, all none-trivial zeros for Zeta function will have only imaginary part at the stripe line at [0.5].

References

Montgomery, Hugh L. *(1973), "The pair correlation of zeros of the zeta function", Analytic number theory, Proc. Symposia. Pure Math., XXIV, Providence, R.I.: American Mathematical Society, pp. 181*– Nicely, Thomas R. (1999), *"New maximal prime gaps and first occurrences", Mathematics of Computation, 68 (227): 1311–1315, Bibcode:1999MaCom..68.1311N,*

Copyrights