Unfolding Technique for Manifold in complex plane

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Unfolding Technique for a Manifold in complex plane

Abstract

In This paper we introduce new unfolding technique for manifolds in complex plane Using basic features from complex plane. During this Technique exploration we will introduce a general visual explanation for Zeta function Zeros. Finally, we will see a visualization for the sign oscillations issue at [6] and a visualization for natural numbers re-synchronization on steady bases almost equal to [12.5].

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

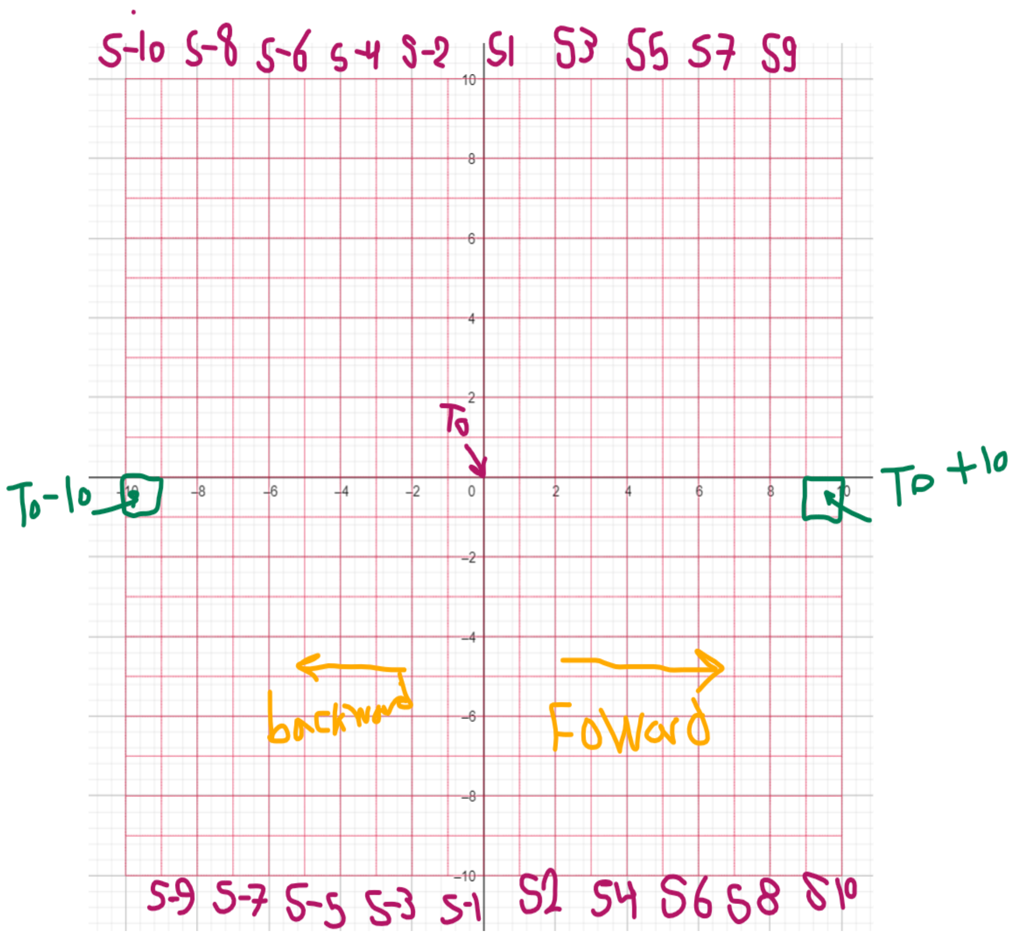
1. Introduction

$$Frame\ of\ reference = i * x$$

Complex plane frame of reference represents all basic natural numbers from [0,10]

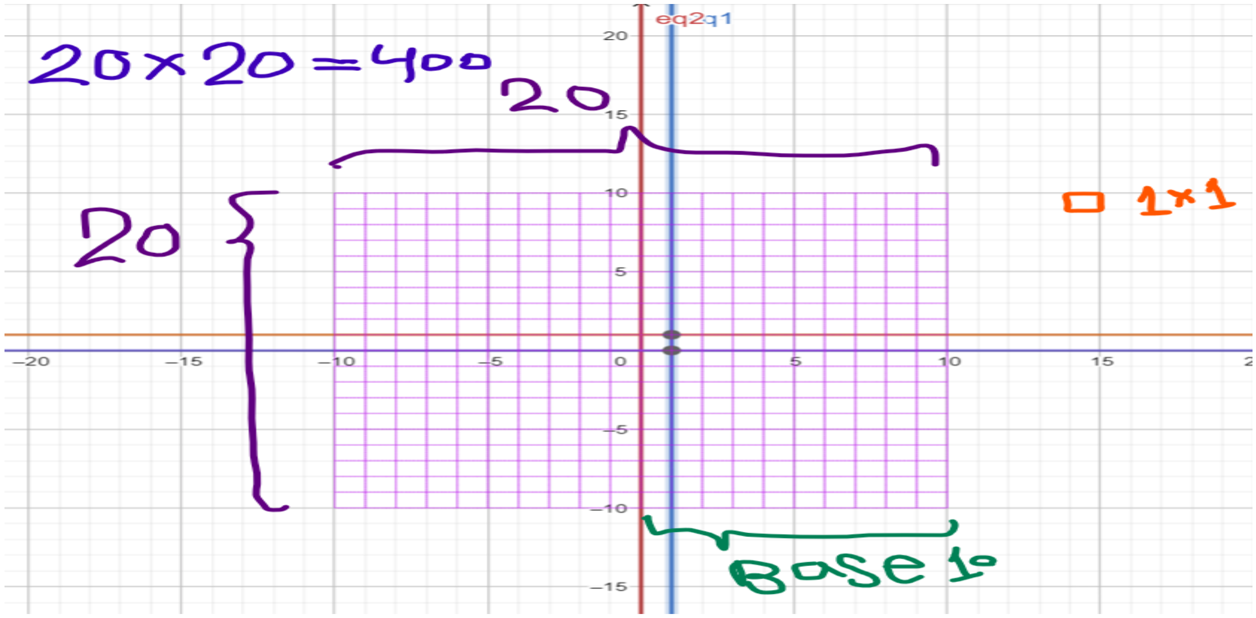
It contains 400-unit squares, square unit area is 1.

If our observation point (T0) was at center point at the origin (0,0), Each unit square represents [+1] one step towards future from current point (T0). and each unit square before our [-1] observation point (T0) represents one step backwards from our observation point (T0).



1- Complex plane Frame of reference

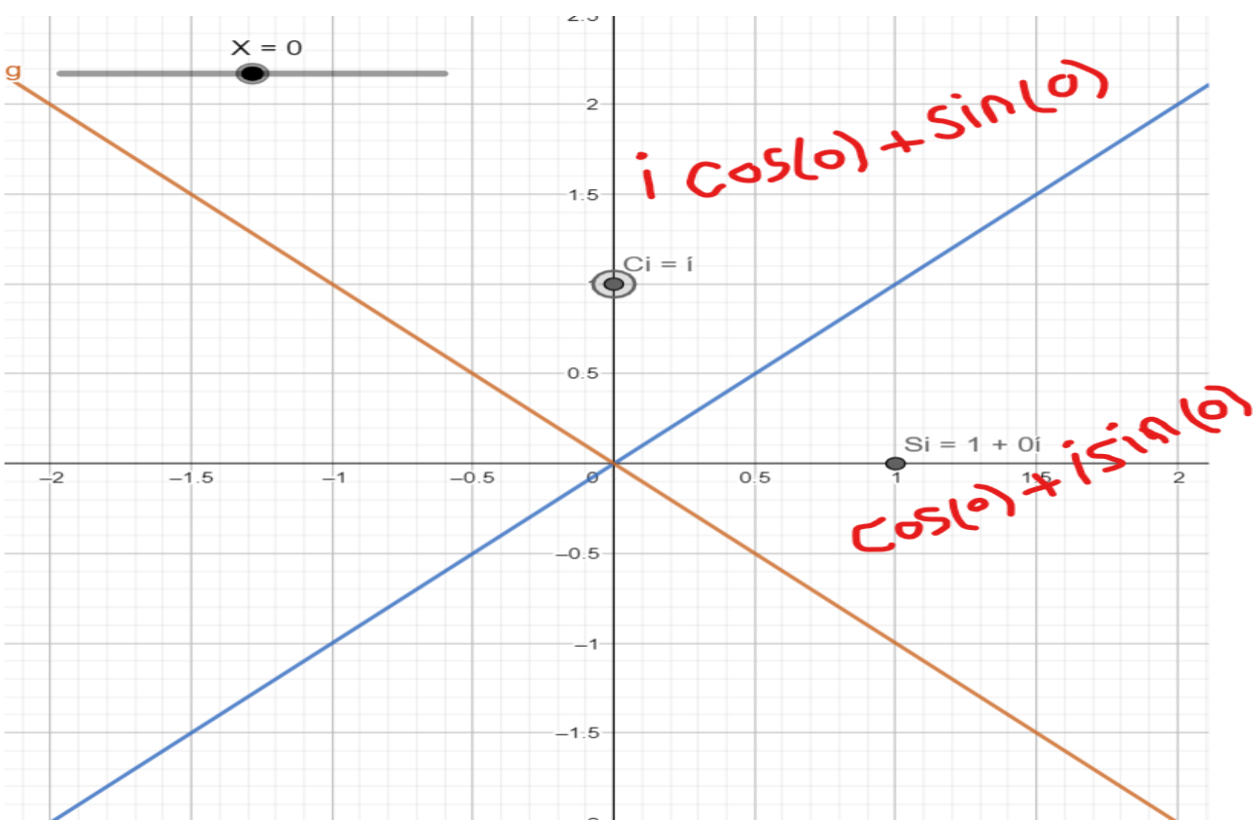
$$G(1) = ix$$



2- In complex plane we are going to represent its units in term of [Sin] and [Cos]

$$Si = 1 = Cos(0) + i\,Sin(0)$$

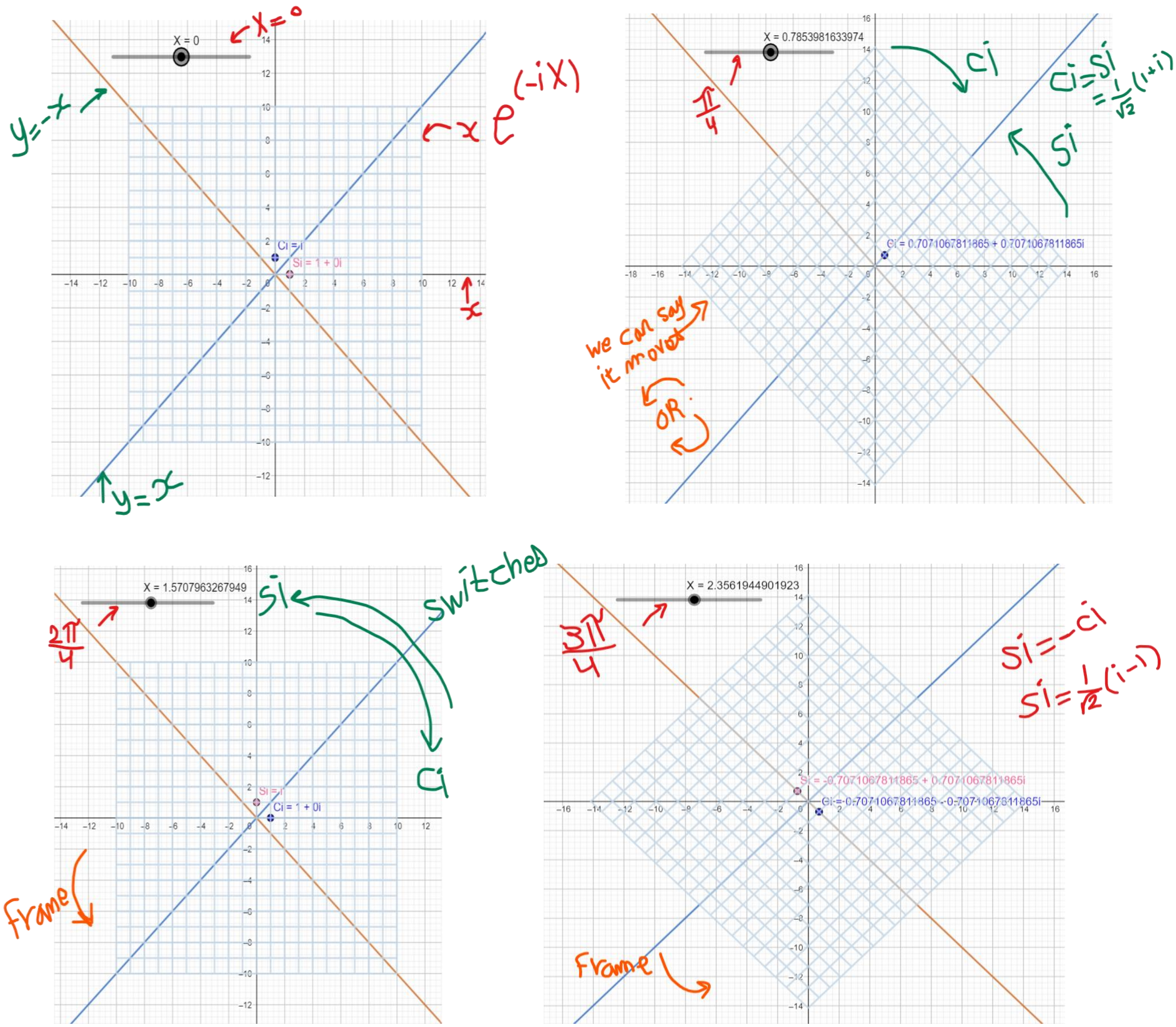
$$Ci = i = i * Cos(0) + Sin(0)$$

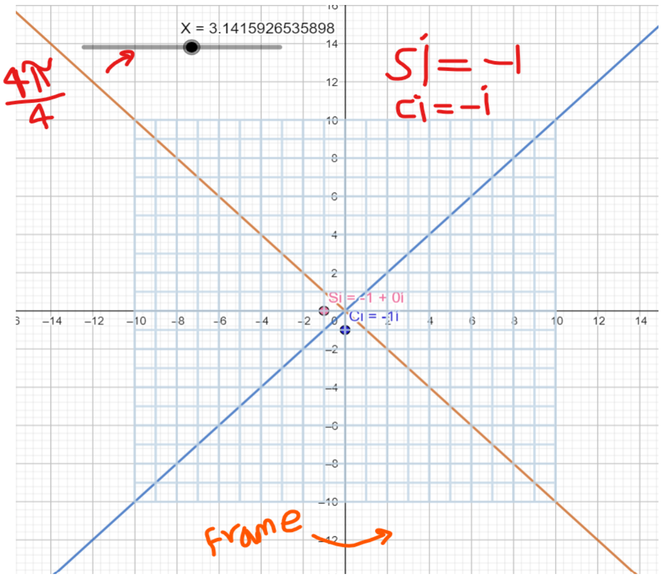


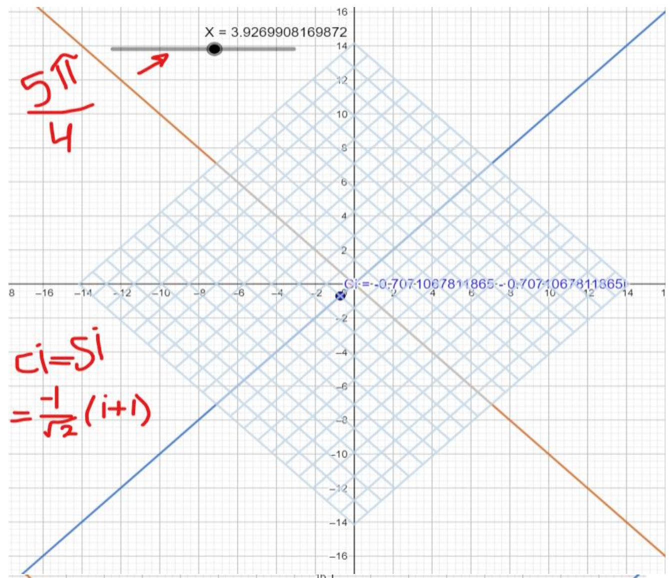
3- Complex plane axis rotation with frame of reference

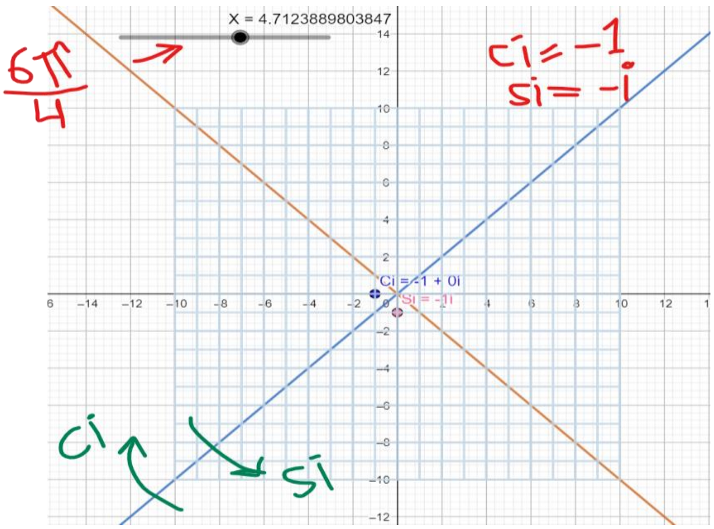
Ci and Si will move in opposite directions of each other.

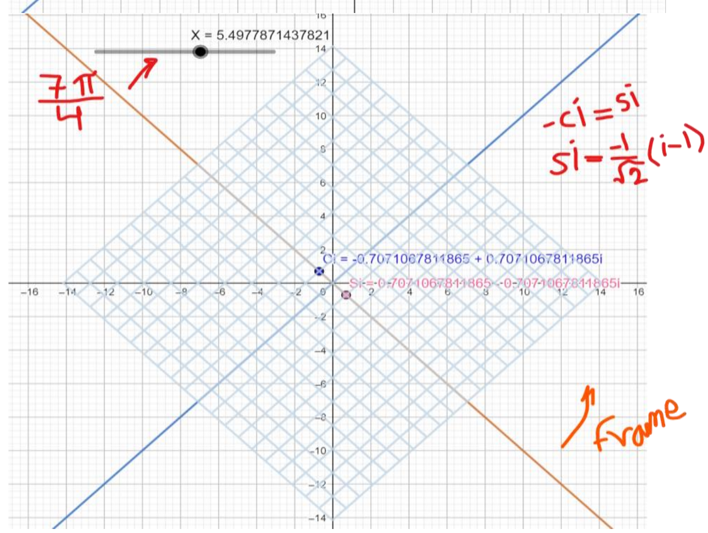
$at\ X = \frac{\pi}{4}\ and\ at\ X = \frac{5*\pi}{4};\ both\ Ci = Si$

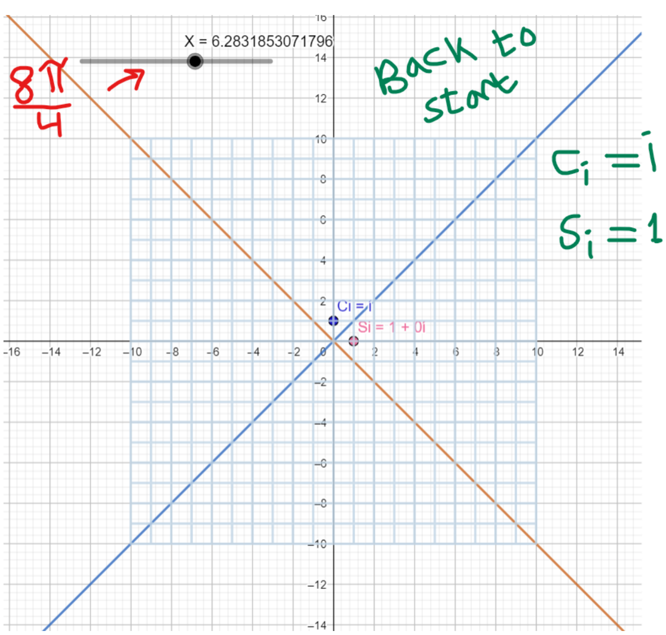



X = 3.1415926535898
4π/4
Si = −1
Ci = −i
Si = -1 + 0i
Ci = -1i
frame


X = 3.9269908169872
5π/4
Ci = -0.7071067811865 - 0.7071067811865i
ci = si
= −1/√2 (i+1)


X = 4.7123889803847
6π/4
ci = −1
si = −i
Ci = -1 + 0i
Si = -1i
ci
si


X = 5.4977871437821
7π/4
−ci = si
si = −1/√2 (i−1)
Ci = -0.7071067811865 + 0.7071067811865i
Si = 0.7071067811865 - 0.7071067811865i
frame


X = 6.2831853071796
8π/4
Back to start
Ci = i
Si = 1
Ci = i
Si = 1 + 0i

4- In base e^{i} at initial it has its own transformation for complex plane axis and we need 6.2831853071793 *steps to complete full* 360 *cycle*

$$e^{i} = 0.5403023058681 + 0.8414709848079 i$$

$$e^{1* i} = Cos(\theta) + i\, Sin(\theta)$$
$$\theta = \alpha = Cos^{-1}(0.5403023058681)$$

$$c = \frac{360}{57.295779513085}$$

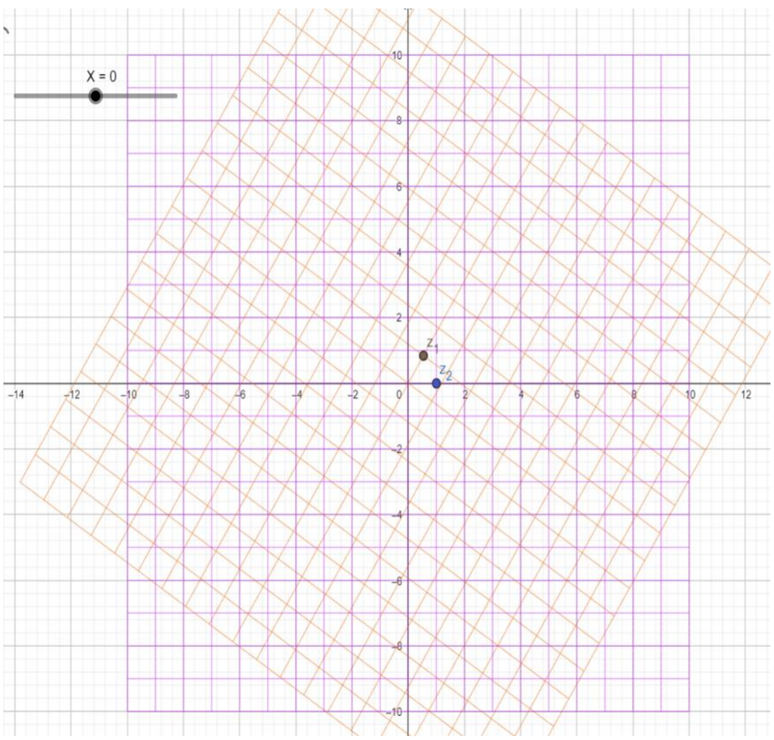
$\rightarrow 6.2831853071793$

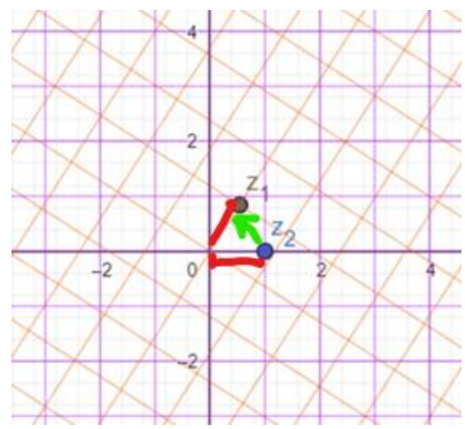
$$\alpha = \cos^{-1}(0.5403023058681)$$

$\rightarrow 57.295779513085°$

$$z_1 = e^{i}$$

$\rightarrow 0.5403023058681 + 0.8414709848079 i$





5- In Systems with base [e] there is already initial transformation for complex plane as we showed in point (4). In this system with base [e]

$$e = e^{\frac{1}{i} * i} = \mathrm{Cos}\left(\frac{1}{i}\right) + i\, Sin\left(\frac{1}{i}\right)$$

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

$$e = \mathrm{Cos}(-i) + i\, Sin(-i)$$

IF

$z_2 = \cos(-i) + i\ \sin(-i)$

$\rightarrow 2.718281828459 + 0i$

$$i = i\,\mathrm{Cos}(0) + Sin(0)$$

$$e = \mathrm{Cos}(-(i\,\mathrm{Cos}(0) + Sin(0))) + i\, Sin(-(i\,\mathrm{Cos}(0) + Sin(0)))$$

IF

$z_4 = \sin(\cos(0))$

$\rightarrow (0.8414709848079,\ 0)$

$d = \cos(\cos(0))$

$\rightarrow 0.5403023058681$

AND

$z_5 = e^{i}$

$\rightarrow 0.5403023058681 + 0.8414709848079i$

THEN

$$e^{i} = \mathrm{Cos}(\mathrm{Cos}(0)) + i\, Sin(Cos(0))$$

And this Cos(0) = 1

Note this one degree in the new system with base [e] not in the original complex plane axis.

6- Complex plane with base unit [e = 2.718281828459]

$$i = e^{\pi i} = Cos(\pi) + i\ Sin(\pi)$$

$$1 = e^{0i} = Cos(0) + i\ Sin(0)$$

$$e = e^{\frac{1}{i}*i} = Cos\left(\frac{1}{i}\right) + i\ Sin\left(\frac{1}{i}\right) = Cos(-i) + i\ Sin(-i)$$

$$e\ = Cos(-i) + i\ Sin(-i)$$

We showed that.

$$i = \ i * Cos(0) + \ Sin(0)$$
$$1 = \ Cos(0) + i\ \ Sin(0)$$

$$Cos(\pi) + i\ Sin(\pi) = i * Cos(0) + \ Sin(0)$$

$$Cos(\pi) - \ Sin(0) = i * Cos(0) - i\ Sin(\pi)$$

$$i = \frac{Cos(\pi) - \ Sin(0)}{Cos(0) - \ Sin(\pi)} = \ -1$$

And

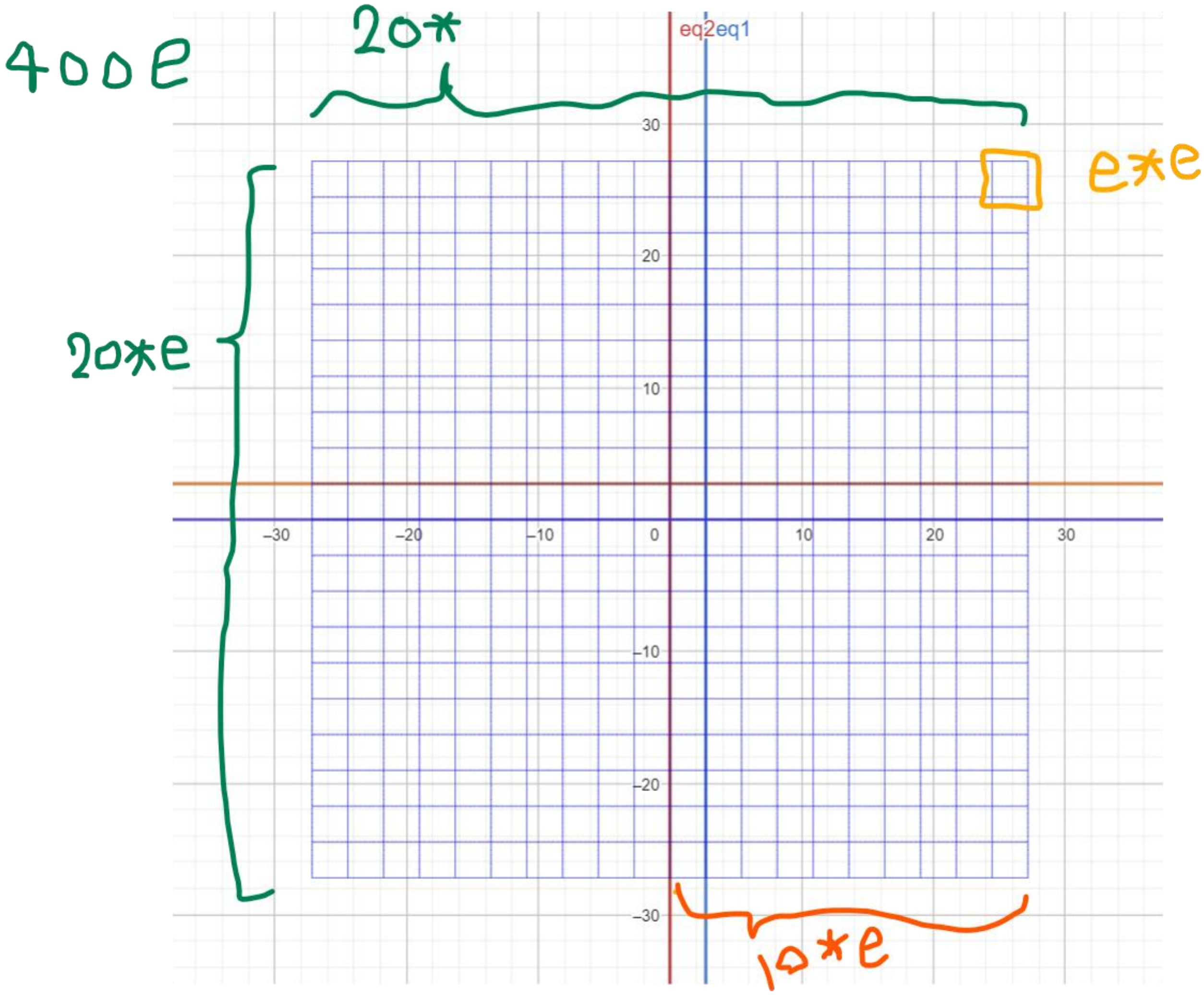
$$1 = \ Cos(0) + i\ \ Sin(0)$$

$$i = \frac{1 - \ Cos(0)}{Sin(0)} = \frac{0}{0} = 1$$

So, [i] has dual state in complex plane at $\theta = \pi$

Here we are going to scale our frame of reference by [e] to convert our system to base [e] as $[e^i]$ $already\ hase\ an\ inital\ tranformation\ from\ the\ original\ complex\ plane.$

$$G(1) = e * \ ix$$

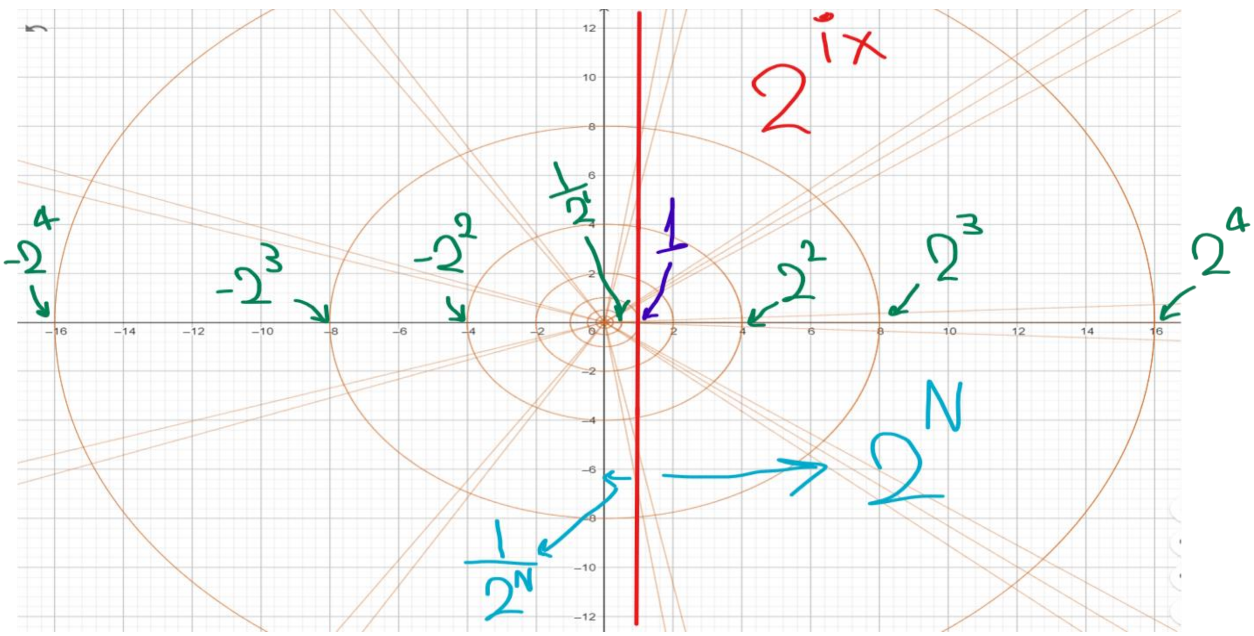


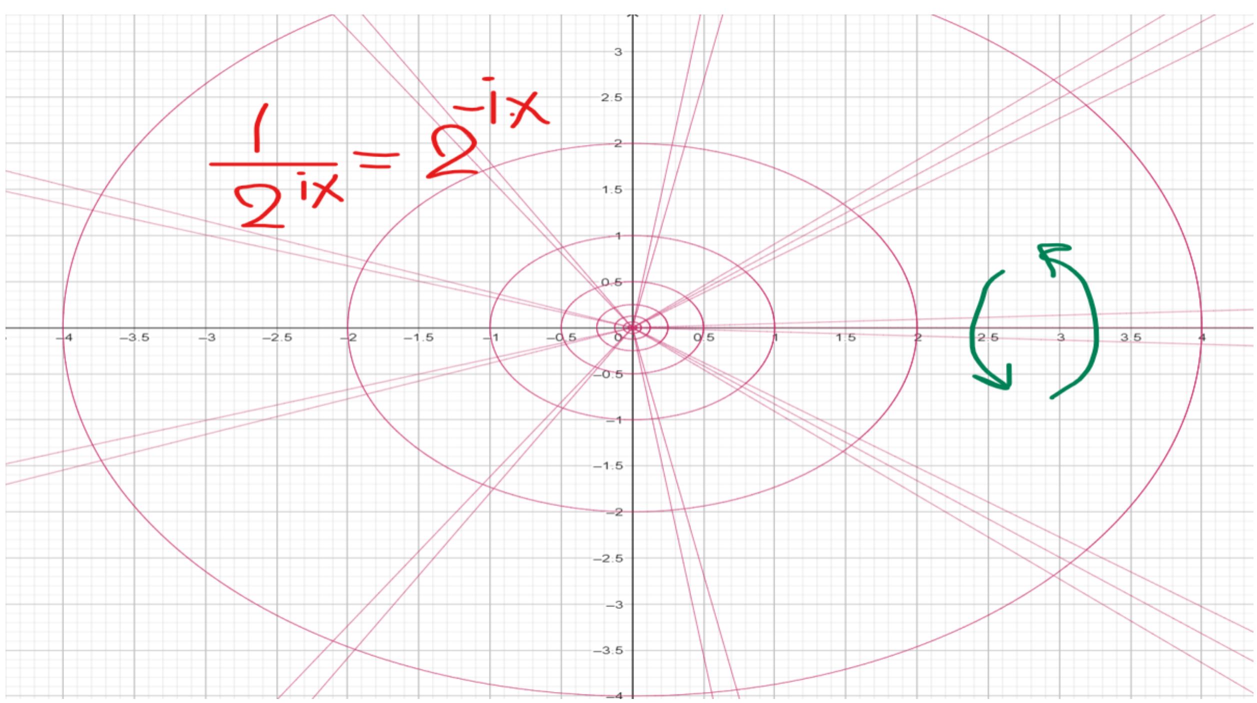
First let use see what the effect on the frame of reference of applying powers of any base [A]
As $e^{-i\omega t}$ $is\ already\ Power\ function$.

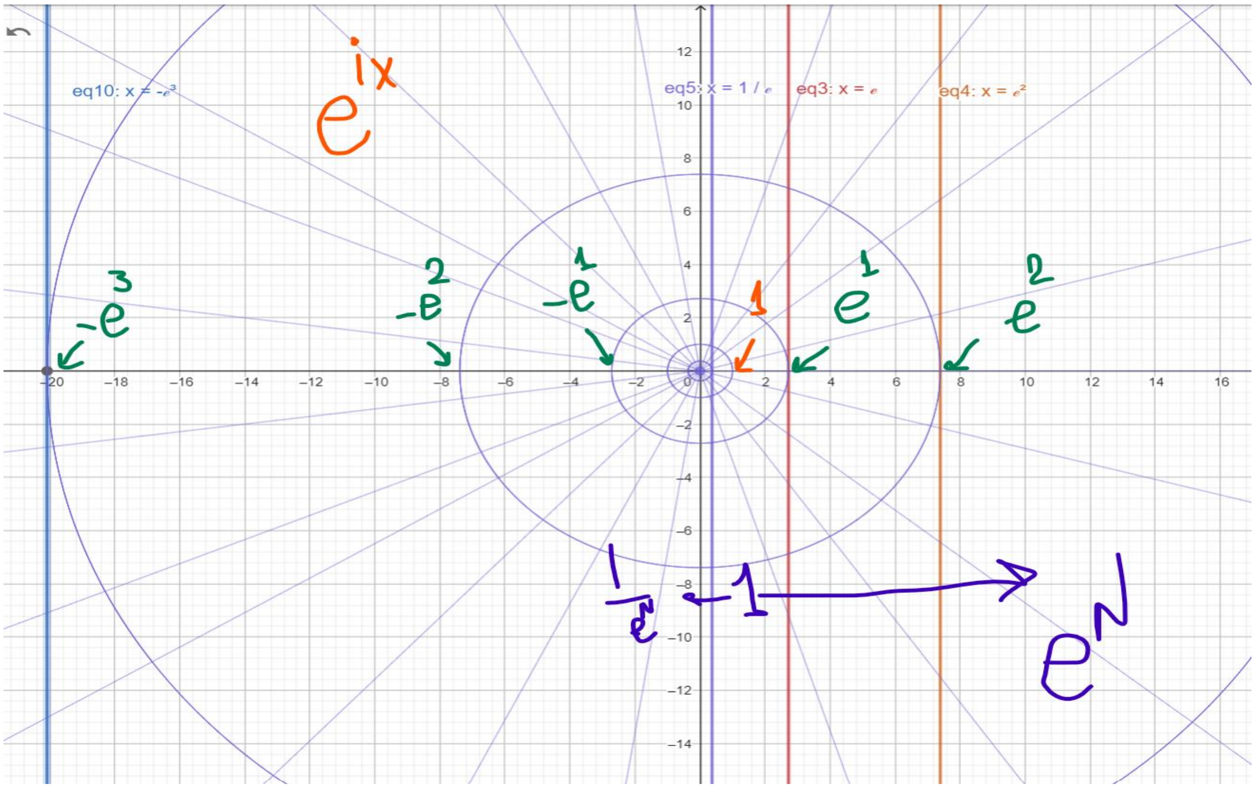
7- Power function using imaginary number and complex plane manifolding.

$$[i]\ has\ a\ unique\ feature\ of\ keeping\ steady\ vector\ length\ becuase\ it\ is\ the\ unit\ of\ a\ complex\ plane$$
$$[i]\ is\ square\ root\ so\ it\ has\ \pm values, and\ also\ natural\ numbers\ have$$
$$\pm values\ which\ make\ 4\ sides\ in\ complex\ plane$$
$$so\ any\ number\ [A]\ raised\ to\ power\ [i]\ will\ keep\ a\ power\ to\ base\ length\ [A]$$

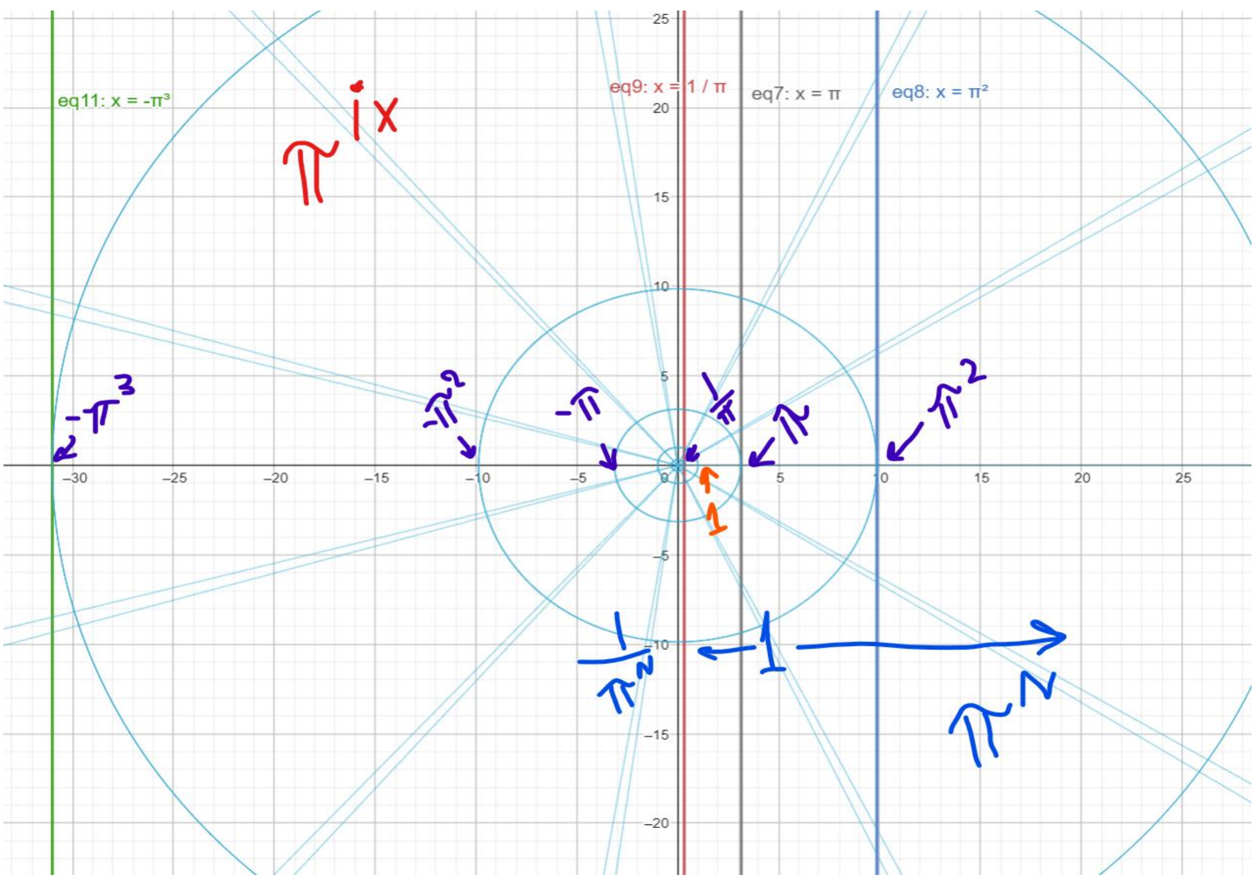
$$Power\ Function = A^{i*x}$$







eq10: x = -e³
eq5: x = 1 / e
eq3: x = e
eq4: x = e²
e^ix
-e^3
-e^2
-e^1
1
e^1
e^2
1/e^N
1
e^N

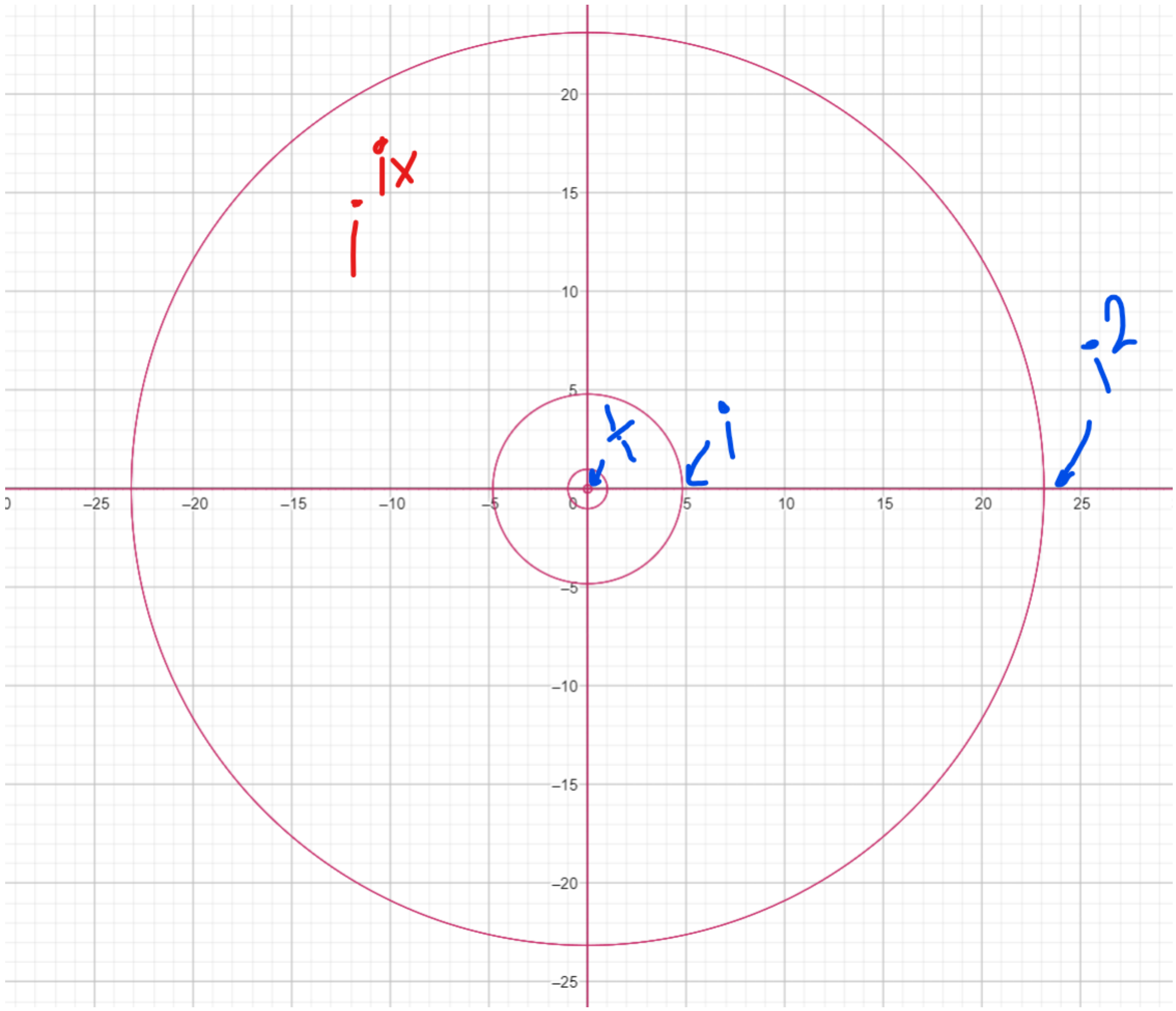


eq11: x = -π³
eq9: x = 1 / π
eq7: x = π
eq8: x = π²
π^ix
-π^3
-π^2
-π
1/π
π
π^2
1
1/π^N
1
π^N

With the same concept we can say that is approximately = 5

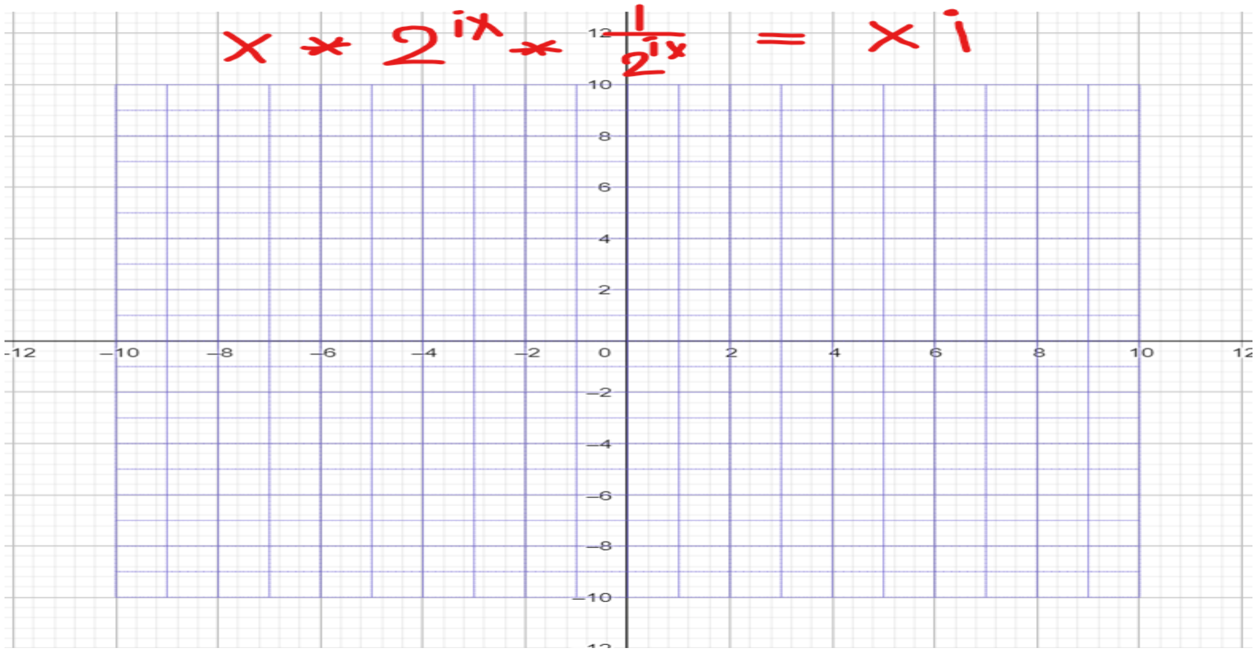
$$i = \frac{1}{0.207879}$$

$\longrightarrow$ 4.8104907181582

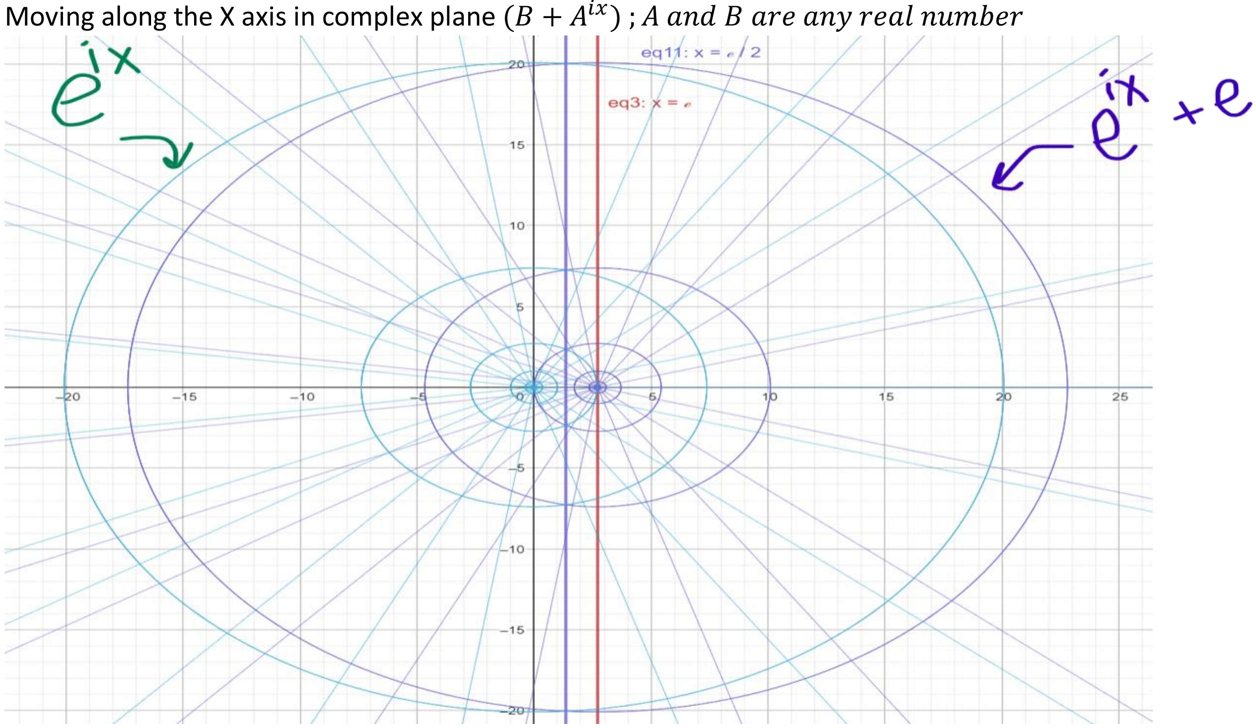


8- Reciprocal of number with base A=2

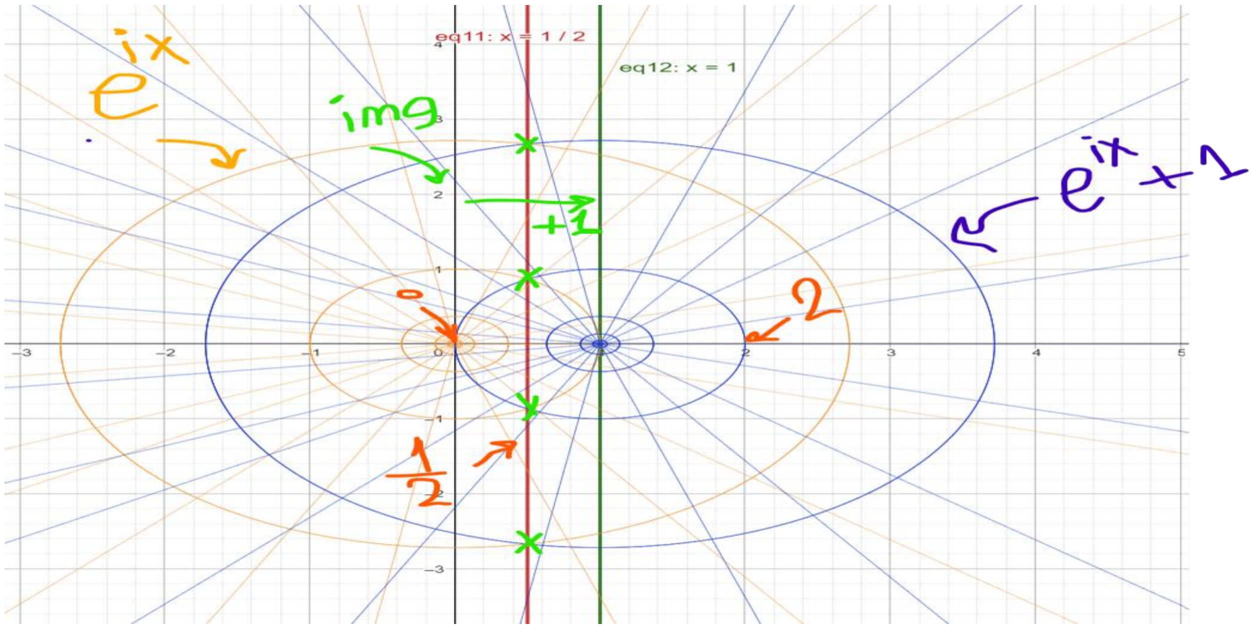
$$x * A^{ix} * \frac{1}{A^{ix}} = i * x$$



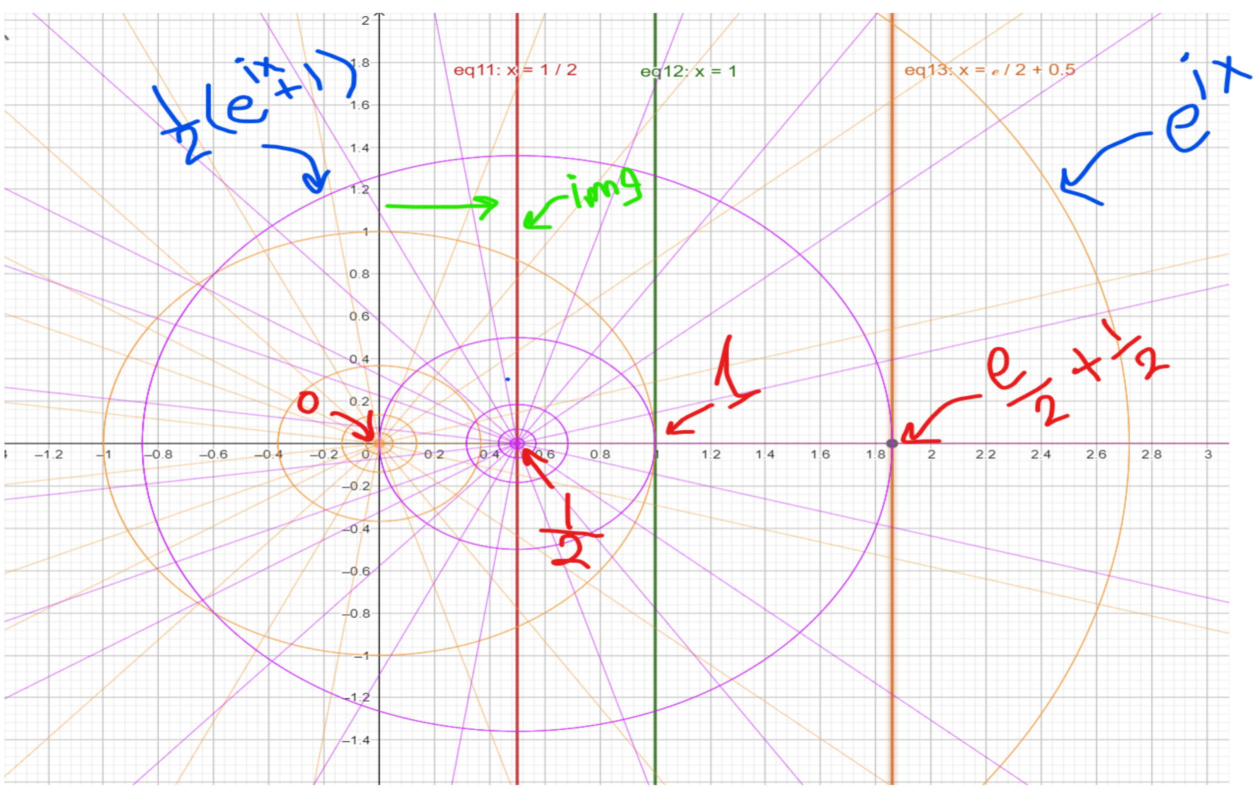
9- Moving along the X axis in complex plane $(B + A^{ix})$; $A\ and\ B\ are\ any\ real\ number$



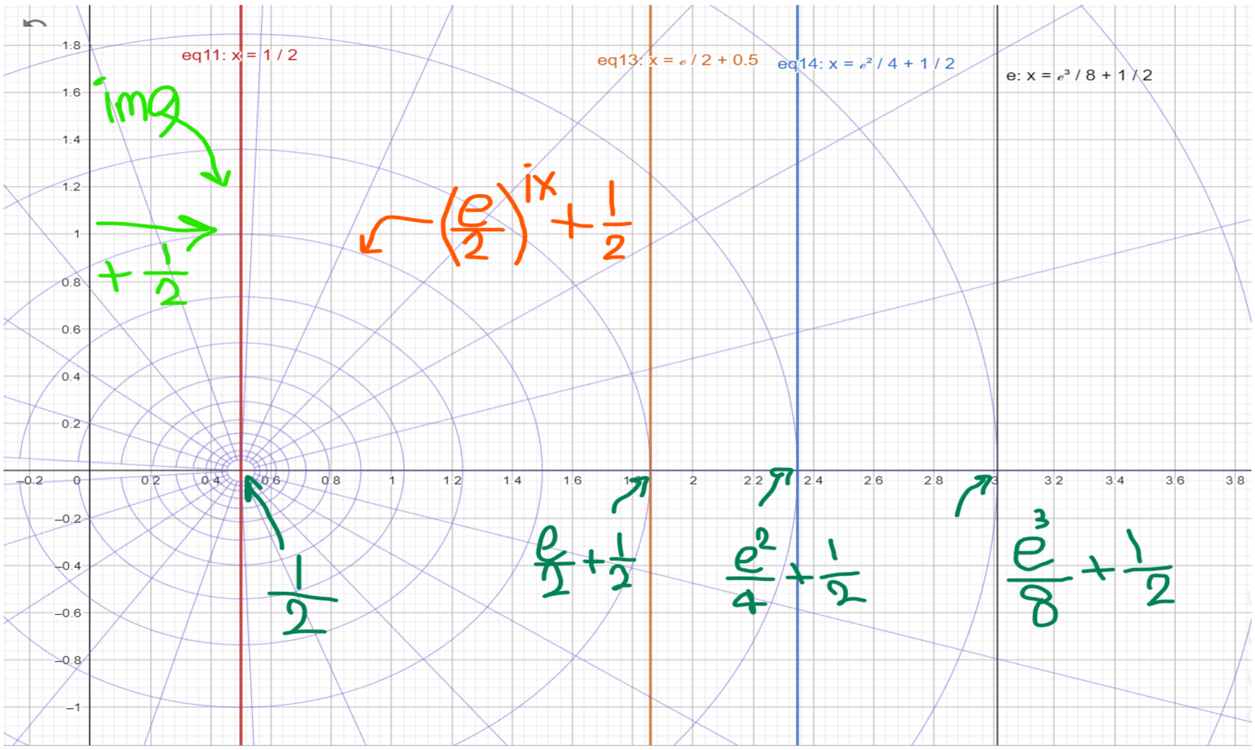
10- Moving along X axis in complex plane $(B + A^{ix})$; $A = e$ and $B = 1$



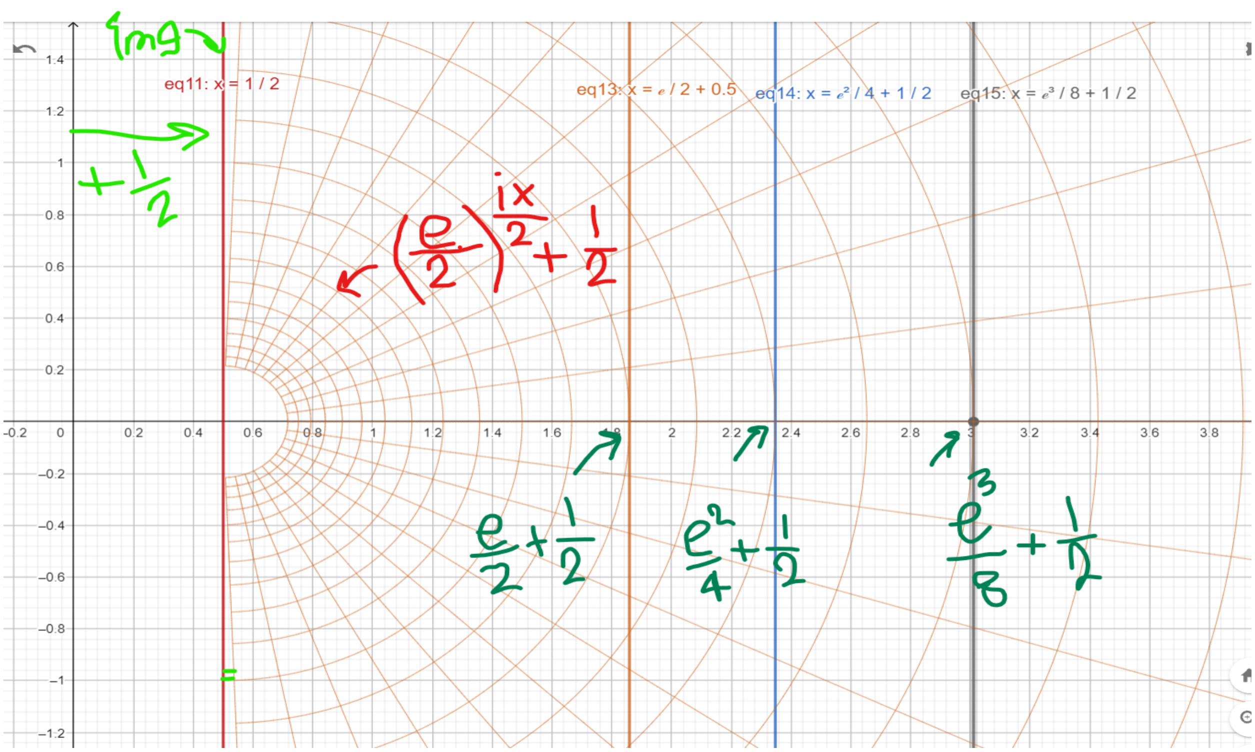
11- Moving along X axis in complex plane $\frac{1}{2} * (B + A^{ix})$; $A = e$ and $B = 1$



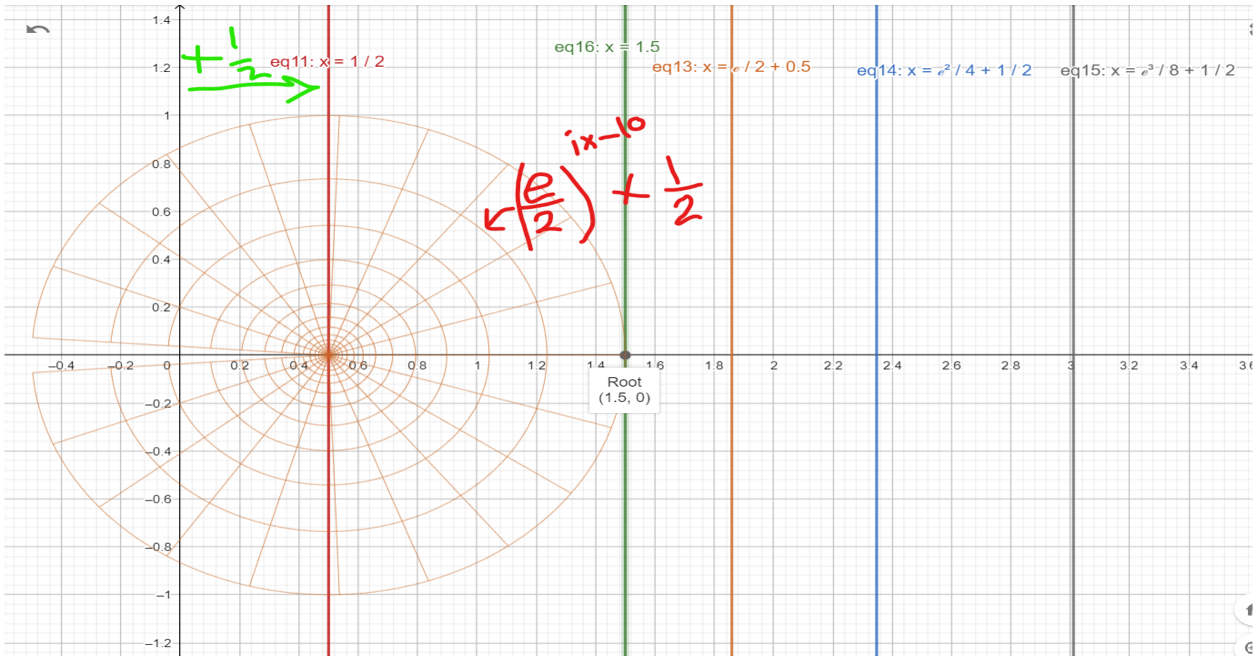
12- Moving along X axis in complex plane $(B + A^{ix})$; $A = \frac{e}{2}$ and $B = \frac{1}{2}$



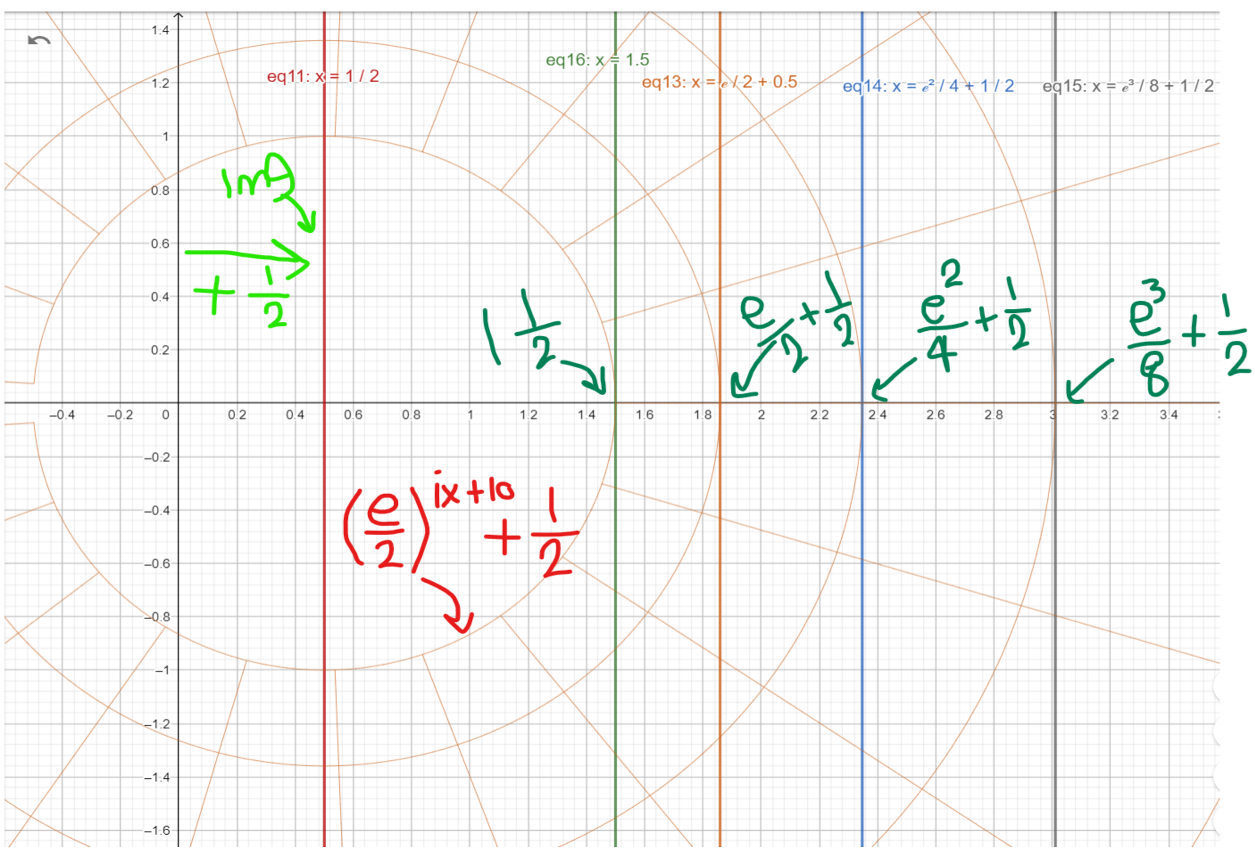
13- Moving along X axis in complex plane $(B + A^{\frac{ix}{2}})$; $A = \frac{e}{2}$ and $B = \frac{1}{2}$



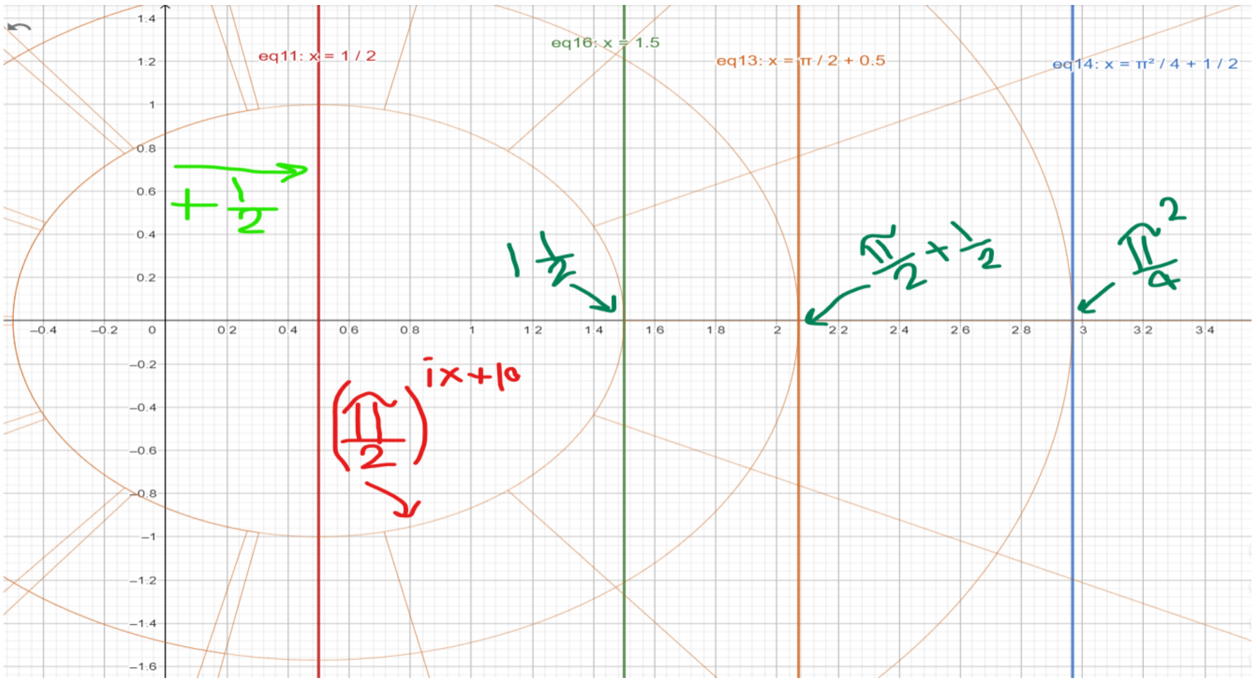
14- Moving along X axis in complex plane $(B + A^{ix-10})$; $A = \frac{e}{2}$ and $B = \frac{1}{2}$



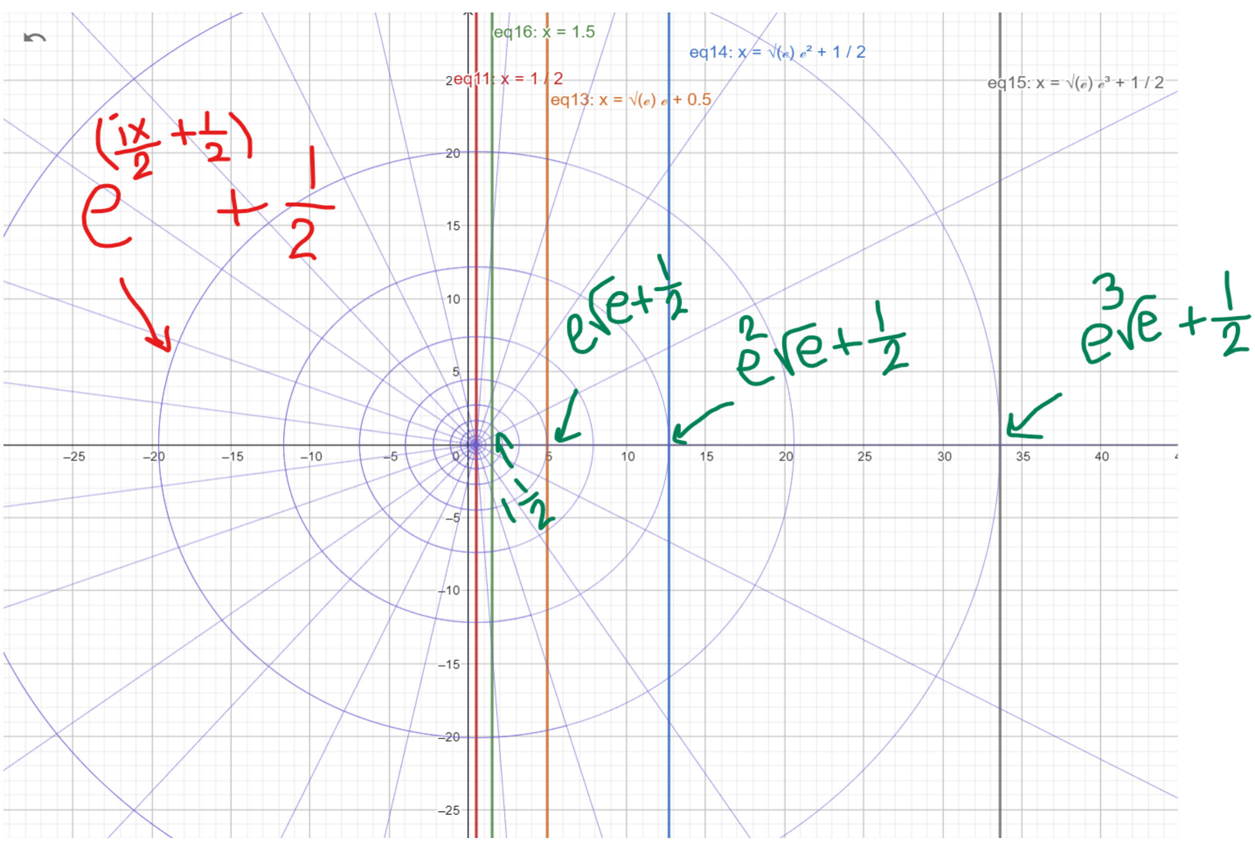
15- Moving along X axis in complex plane $(B + A^{ix+10})$; $A = \frac{e}{2}$ and $B = \frac{1}{2}$



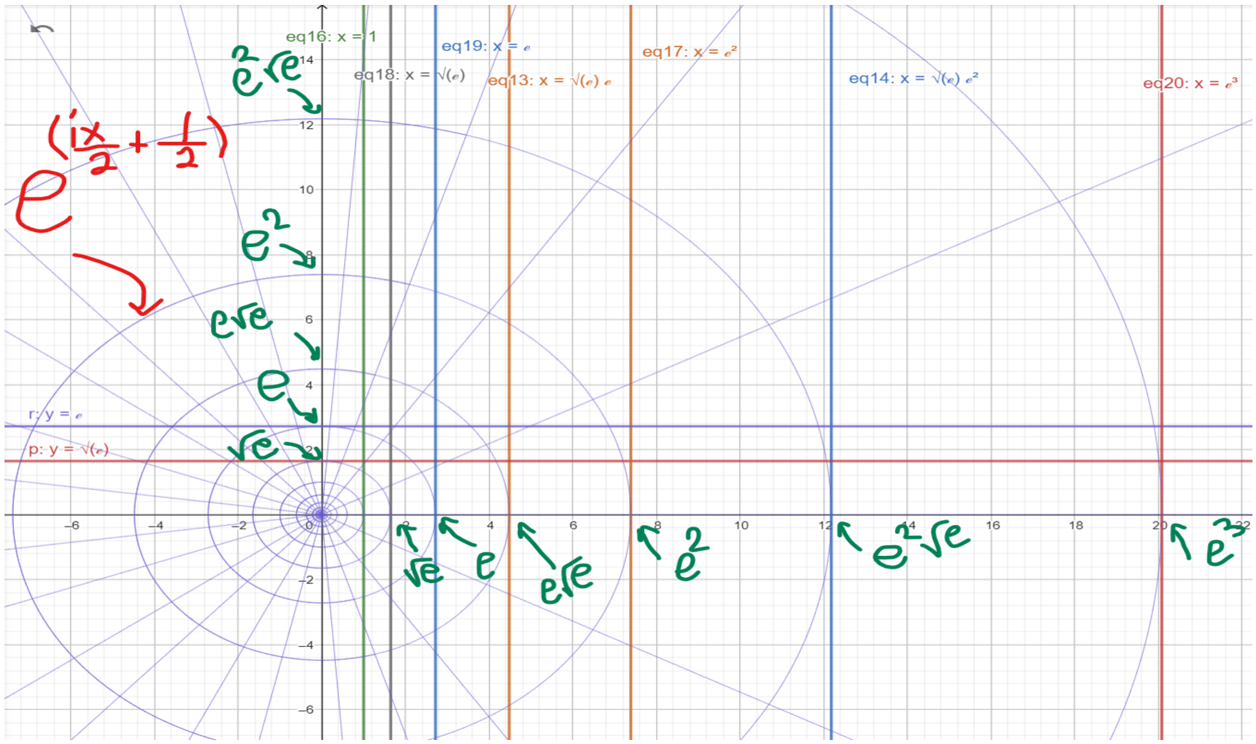
16- Moving along X axis in complex plane $(B + A^{ix+10})$; $A = \frac{\pi}{2}$ and $B = \frac{1}{2}$



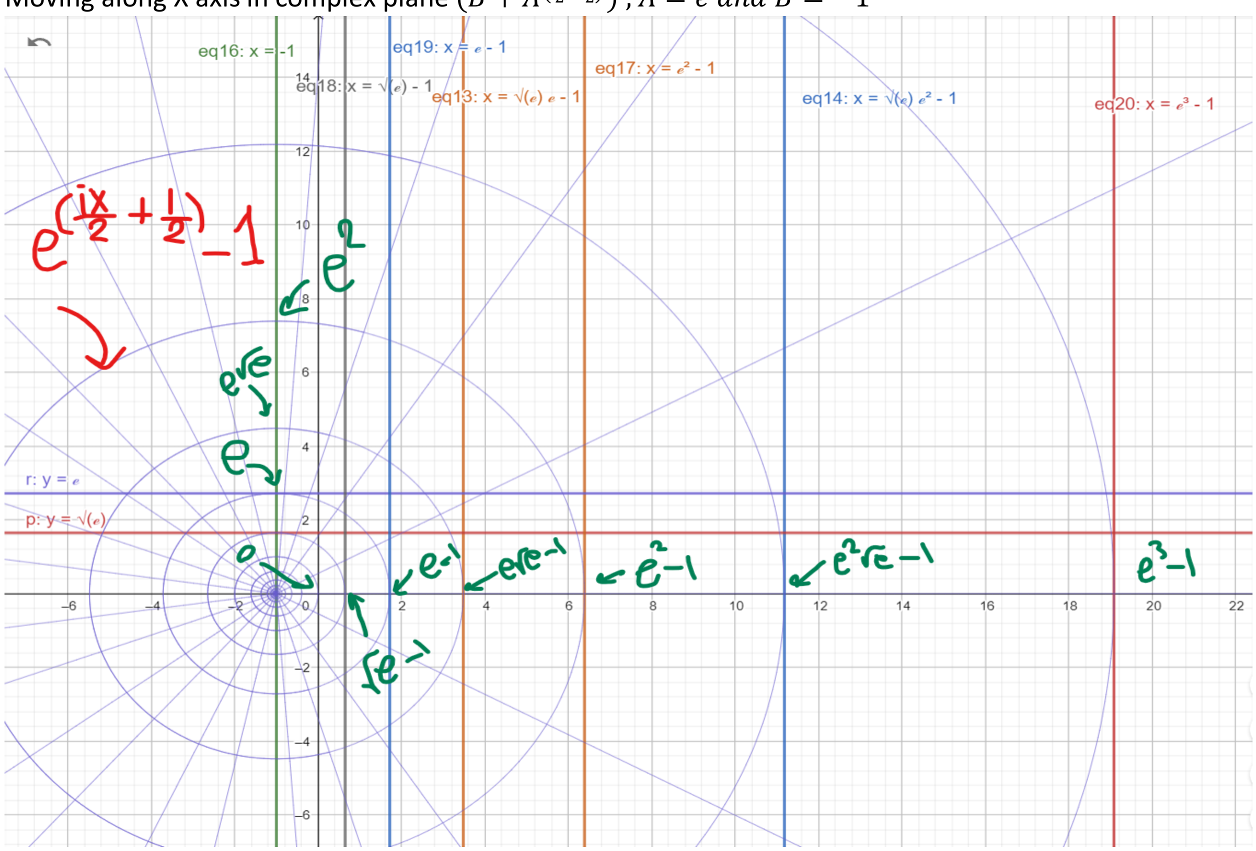
17- Moving along X axis in complex plane $(B + A^{(\frac{ix}{2}+\frac{1}{2})})$; $A = e$ and $B = \frac{1}{2}$



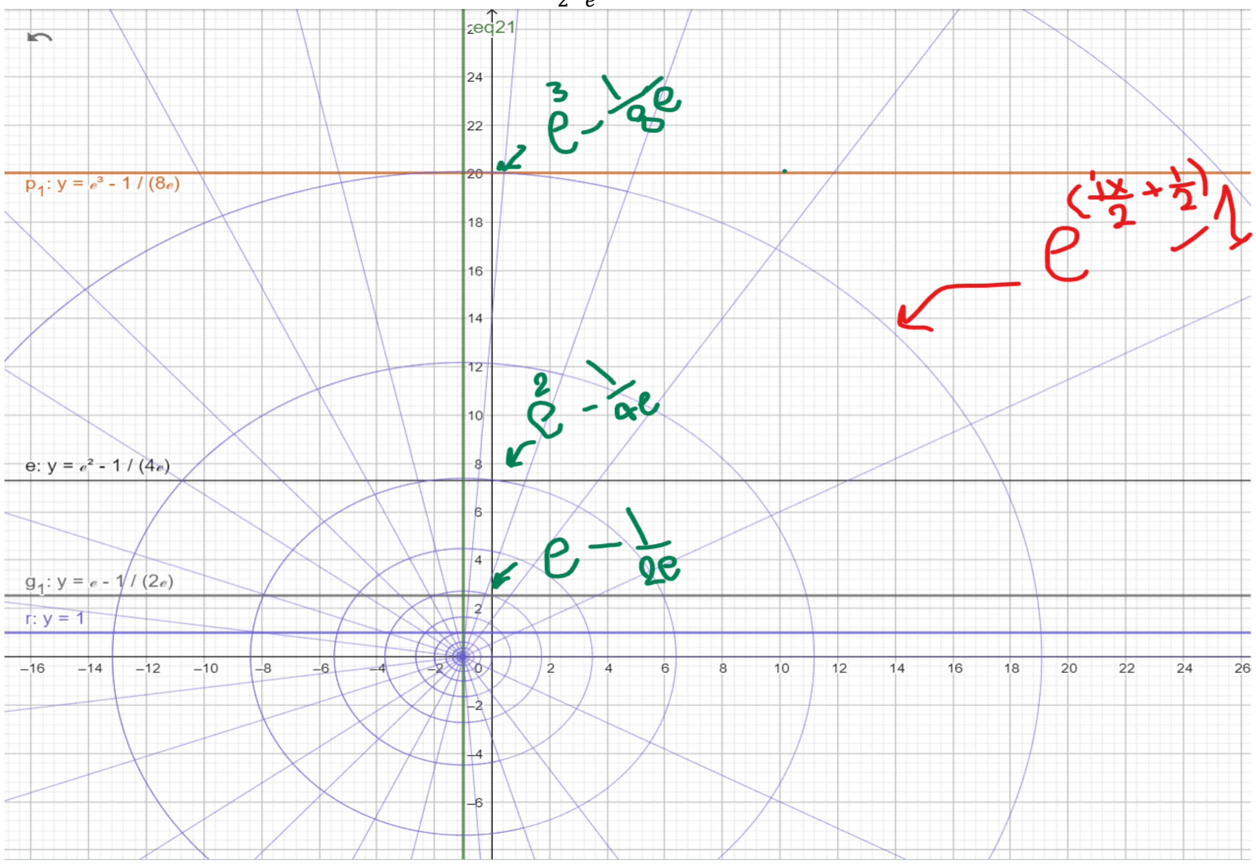
18- Moving along X axis in complex plane $(B + A^{(\frac{ix}{2}+\frac{1}{2})})$; $A = e$ and $B = 0$



19- Moving along X axis in complex plane $(B + A^{(\frac{ix}{2}+\frac{1}{2})})$; $A = e$ and $B = -1$



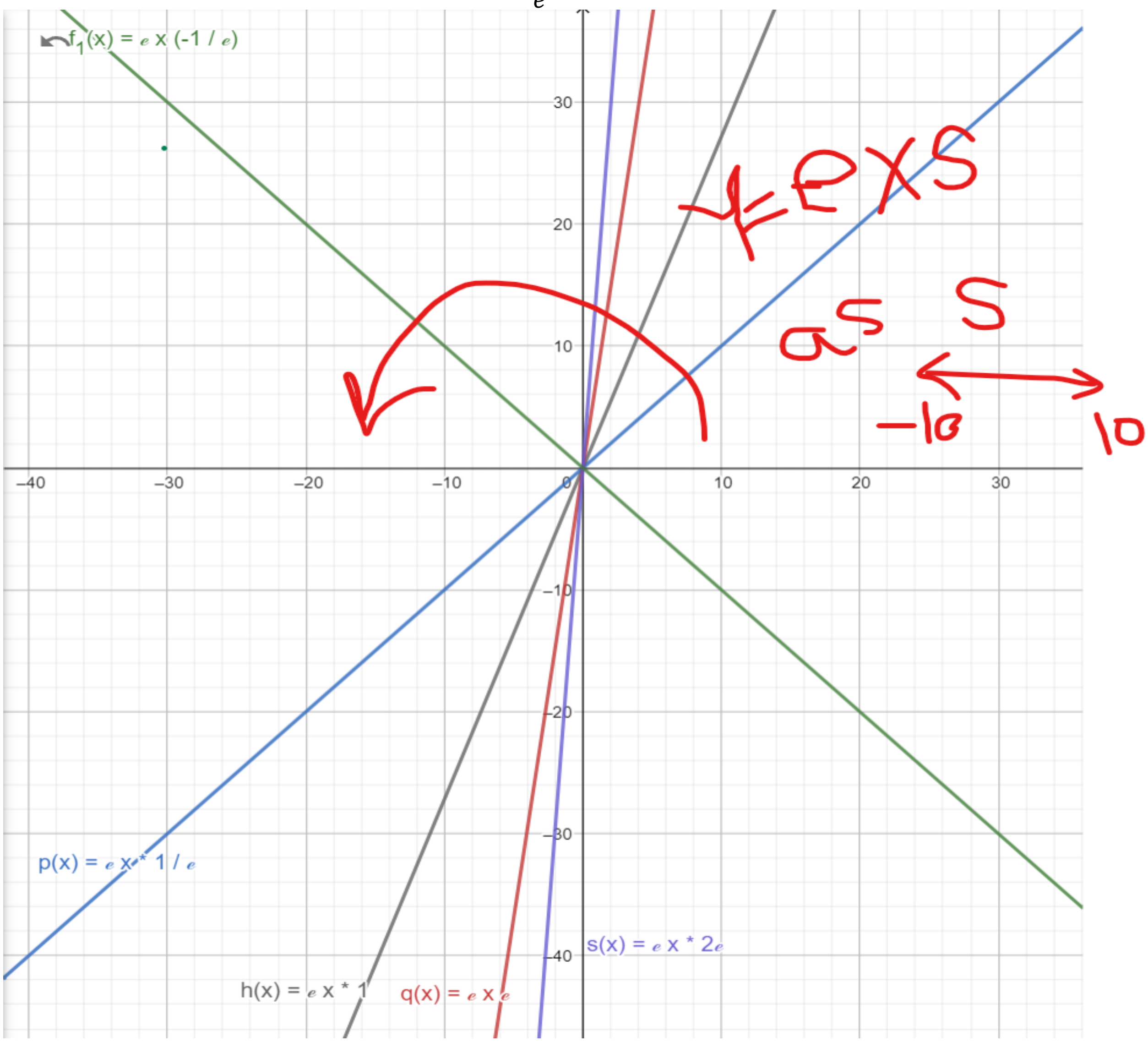
Values at Imaginary axis approximate to $e^N - \frac{1}{2^N e}$; $N \geq 1$



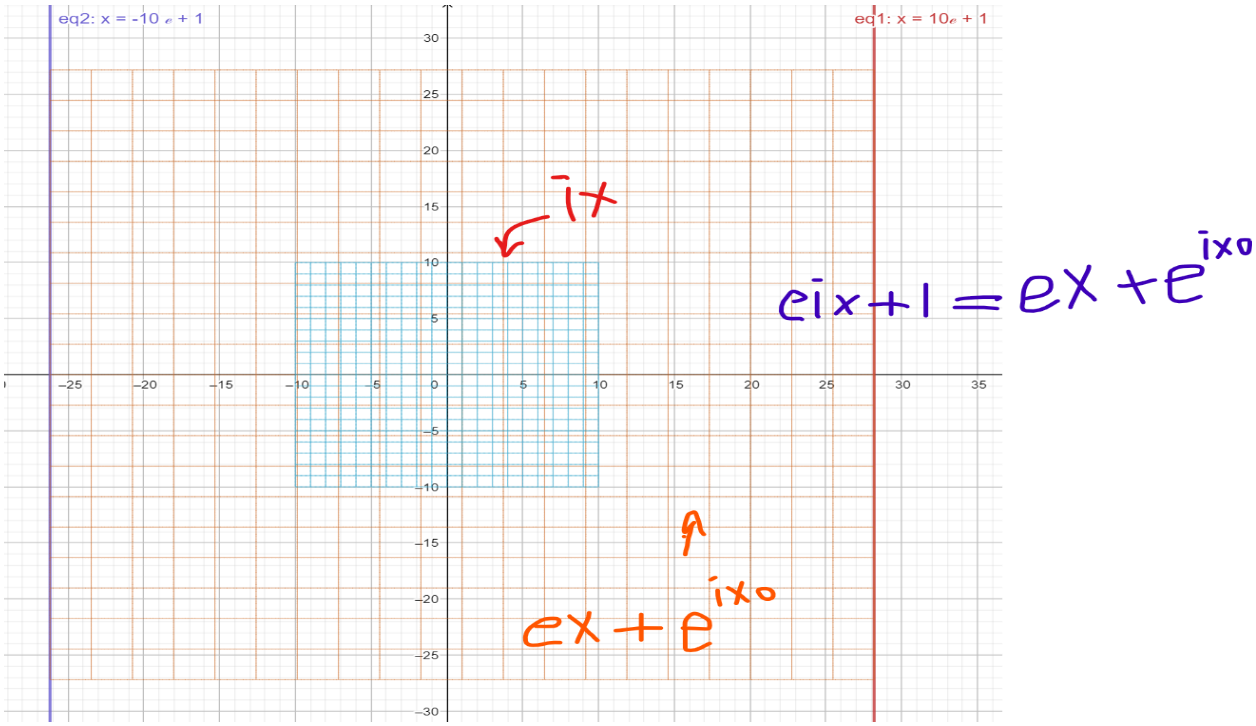
20- Y = X in complex plane $Y = (e * x * A); for\ A = any\ real\ value$
$multiply\ e$
$* x\ by\ any\ function\ [A]\ keeps\ the\ function\ signature\ and\ add\ rotation\ effect\ to\ the\ function\ [A]$

$$for\ example\ when\ A = \frac{1}{e}\ then\ we\ get\ y = X$$

$$for\ example\ when\ A = \frac{-1}{e}\ then\ we\ get\ y = -X$$

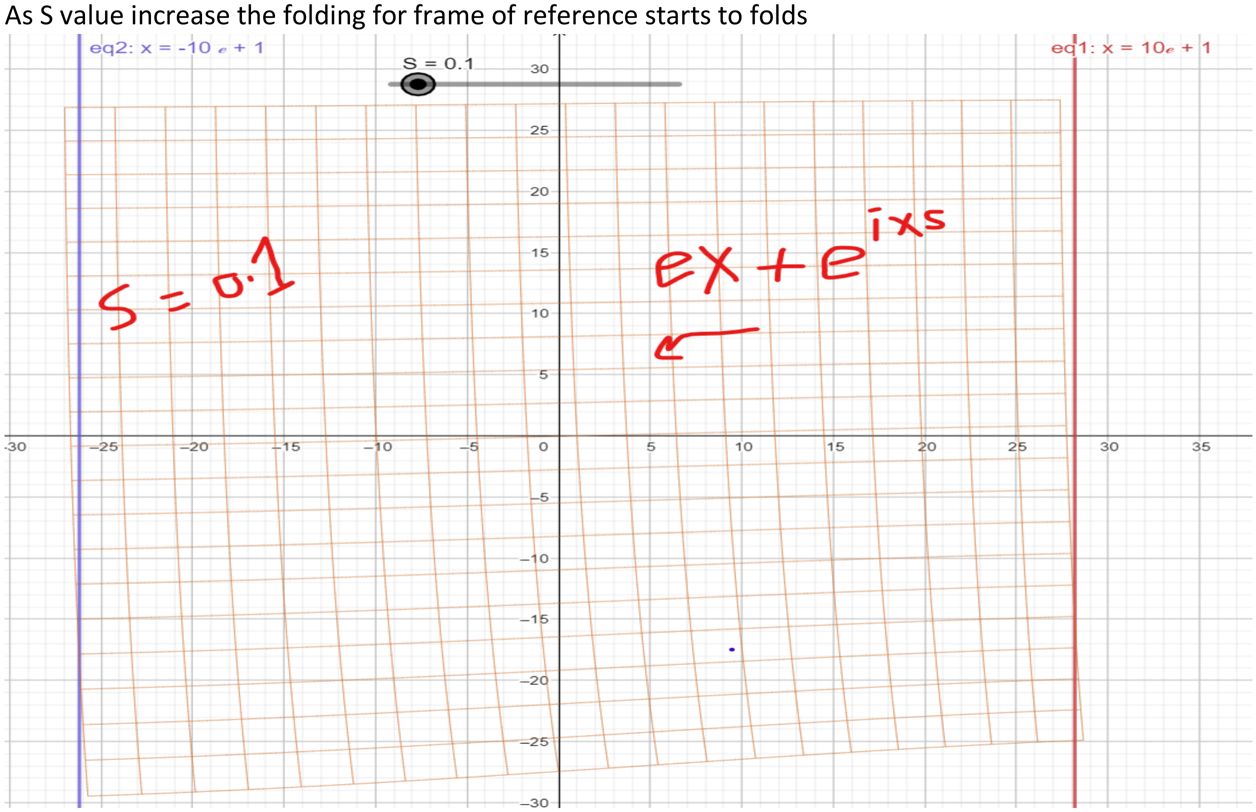


21- $\left(i * e \ * x + 1 = e * x + e^{i*x*0}\right);$



22- $\left(e * x + e^{i*x*S}\right);\ \ S = 0.1$

As S value increase the folding for frame of reference starts to folds

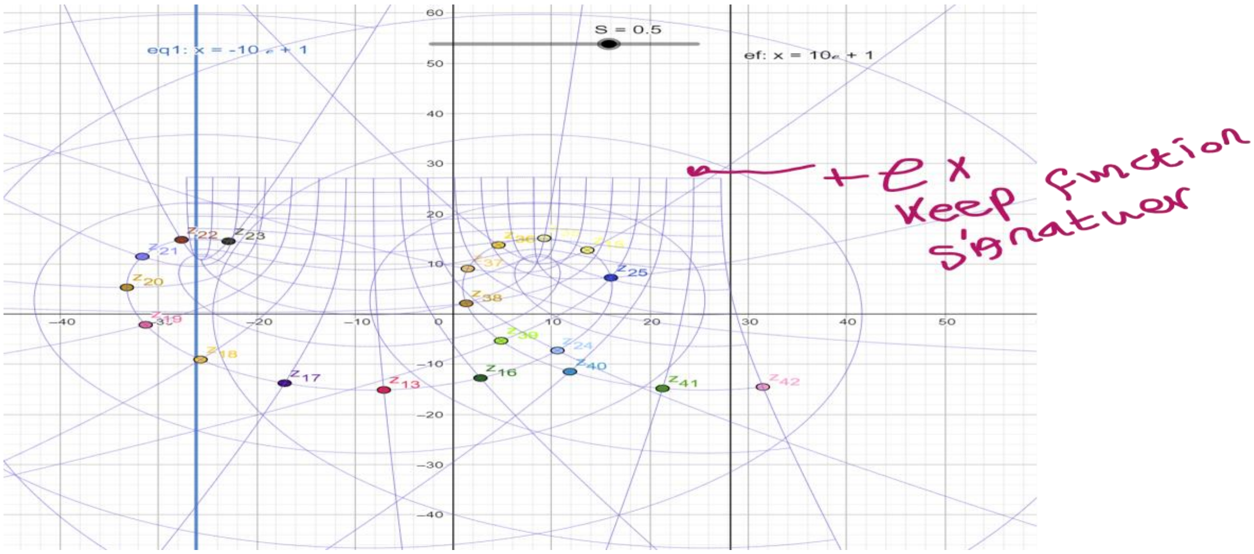


23- $\left(-e * x + e^{-(i*x*S-e)}\right);\ \ S = 0.5$

First Fold at S = 0.5

$$e = \mathrm{Cos}(-i) + i\,Sin(-i)$$

Adding [– e x] and in the same time moving forward or backwards, is doing normalizing using 1/e for the transformation back to the normal frame of reference . so, half frame of reference looks the same



$eq(x) = -e\,x + e^{-(xSi-e)}$

$z_{13} = -3\,e + e^{-(3Si-e)}$
→ -7.0828753810764 - 15.1163006115587ί

$z_{16} = -2\,e + e^{-(2Si-e)}$
→ 2.7513191758836 - 12.7518719723747ί

$z_{17} = -4\,e + e^{-(4Si-e)}$
→ -17.1795256058336 - 13.7797316616187ί

$z_{18} = -5\,e + e^{-(5Si-e)}$
→ -25.7321495853803 - 9.0694038159717ί

$z_{19} = -6\,e + e^{-(6Si-e)}$
→ -31.3122968813342 - 2.1385696096589ί

$z_{20} = -7\,e + e^{-(7Si-e)}$
→ -33.219283016205 + 5.315861022321ί

$z_{21} = -8\,e + e^{-(8Si-e)}$
→ -31.6517414707096 + 11.4687834789022ί

$z_{22} = -9\,e + e^{-(9Si-e)}$
→ -27.6589912801077 + 14.813747752041ί

$z_{23} = -10\,e + e^{-(10Si-e)}$
→ -22.8841271380896 + 14.5317899279655ί

$z_{24} = -1\,e + e^{-(1Si-e)}$
→ 10.5808344529769 - 7.2653403372705ί

$z_{25} = e + e^{Si+e}$
→ 16.017398109895 + 7.26534033727O5ί

$z_{15} = 2\,e + e^{2Si+e}$
→ 13.6244464897198 + 12.7518719723747ί

$z_{35} = 3\,e + e^{3Si+e}$
→ 9.2268155896779 + 15.1163006115587ί

$z_{36} = 4\,e + e^{4Si+e}$
→ 4.5667290218388 + 13.7797316616187ί

$z_{37} = 5\,e + e^{5Si+e}$
→ 1.4506686992101 + 9.0694038159717ί

$z_{38} = 6\,e + e^{6Si+e}$
→ 1.3070850601744 + 2.1385696096589ί

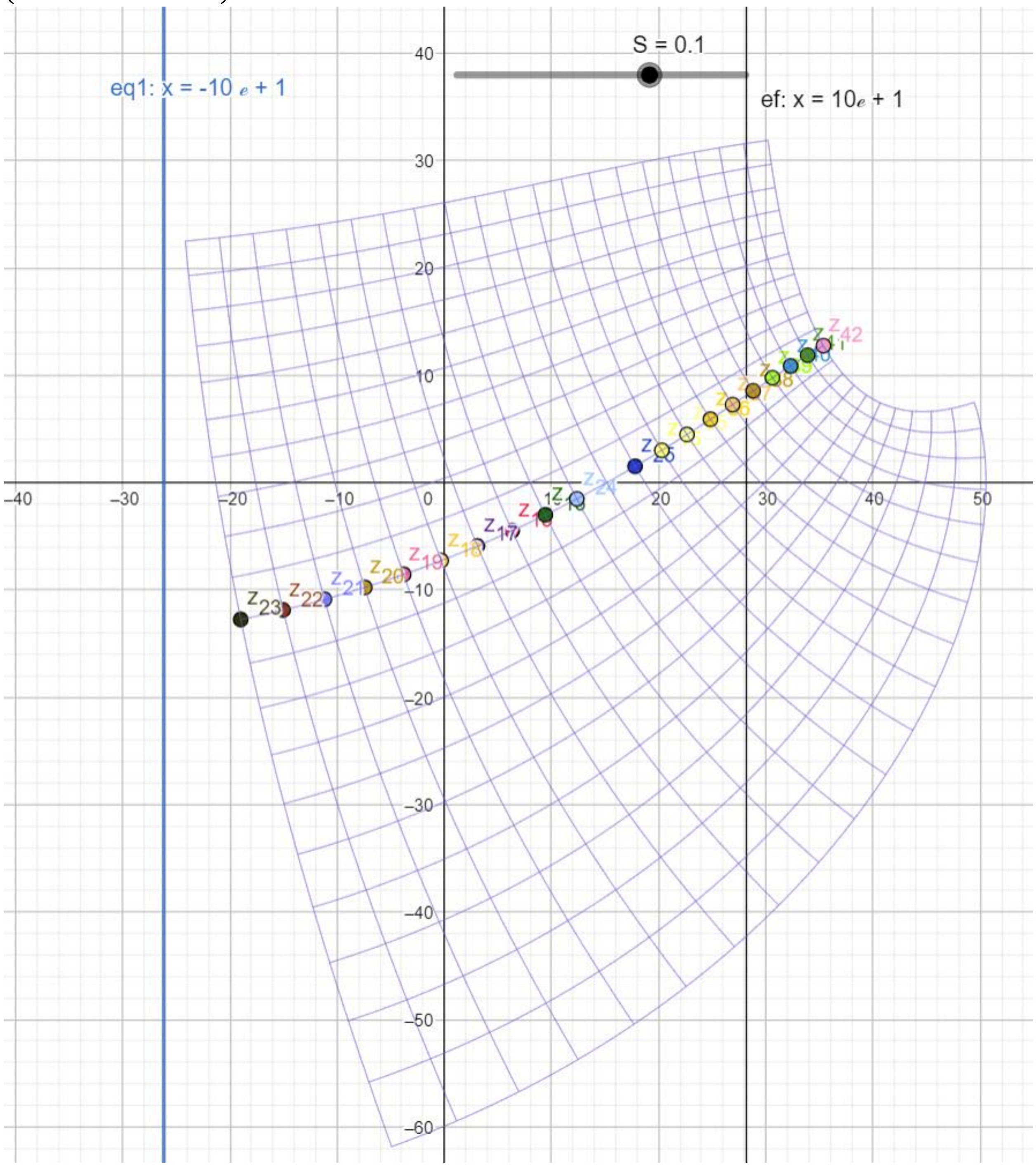
$z_{39} = 7\,e + e^{7Si+e}$
→ 4.8366625822216 - 5.315861022321ί

$z_{40} = 8\,e + e^{8Si+e}$
→ 11.8407677846351 - 11.4687834789022ί

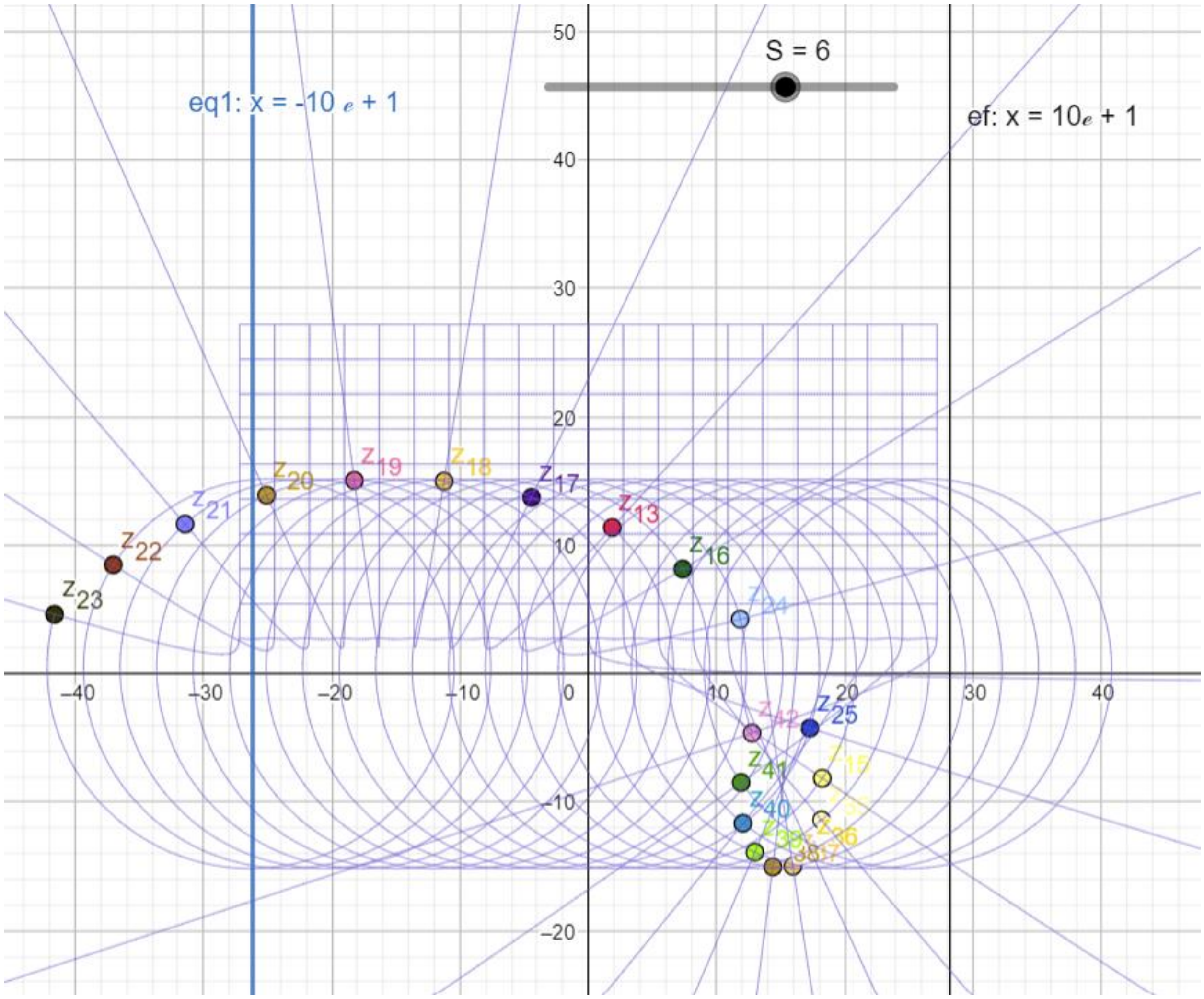
$z_{41} = 9\,e + e^{9Si+e}$
→ 21.2700816321551 - 14.813747752041ί

$z_{42} = 10\,e + e^{10Si+e}$
→ 31.4815094310913 - 14.5317899279655ί

24- $\left(-e * x + e^{-(i*x*S-e)}\right)$; $S = 0.1$



25- $\left(-e * x + e^{-(i*x*S-e)}\right)$; $S = 6$ $First$ Synchronization visual point between all events



26- $\left(-e * x + e^{-(i*x*S-e)}\right)$; $S = 6.285$ *First* Synchronization point between all numbers

after this point the sign will be reversed and this what cause sign shange in i

Which also can be calculated

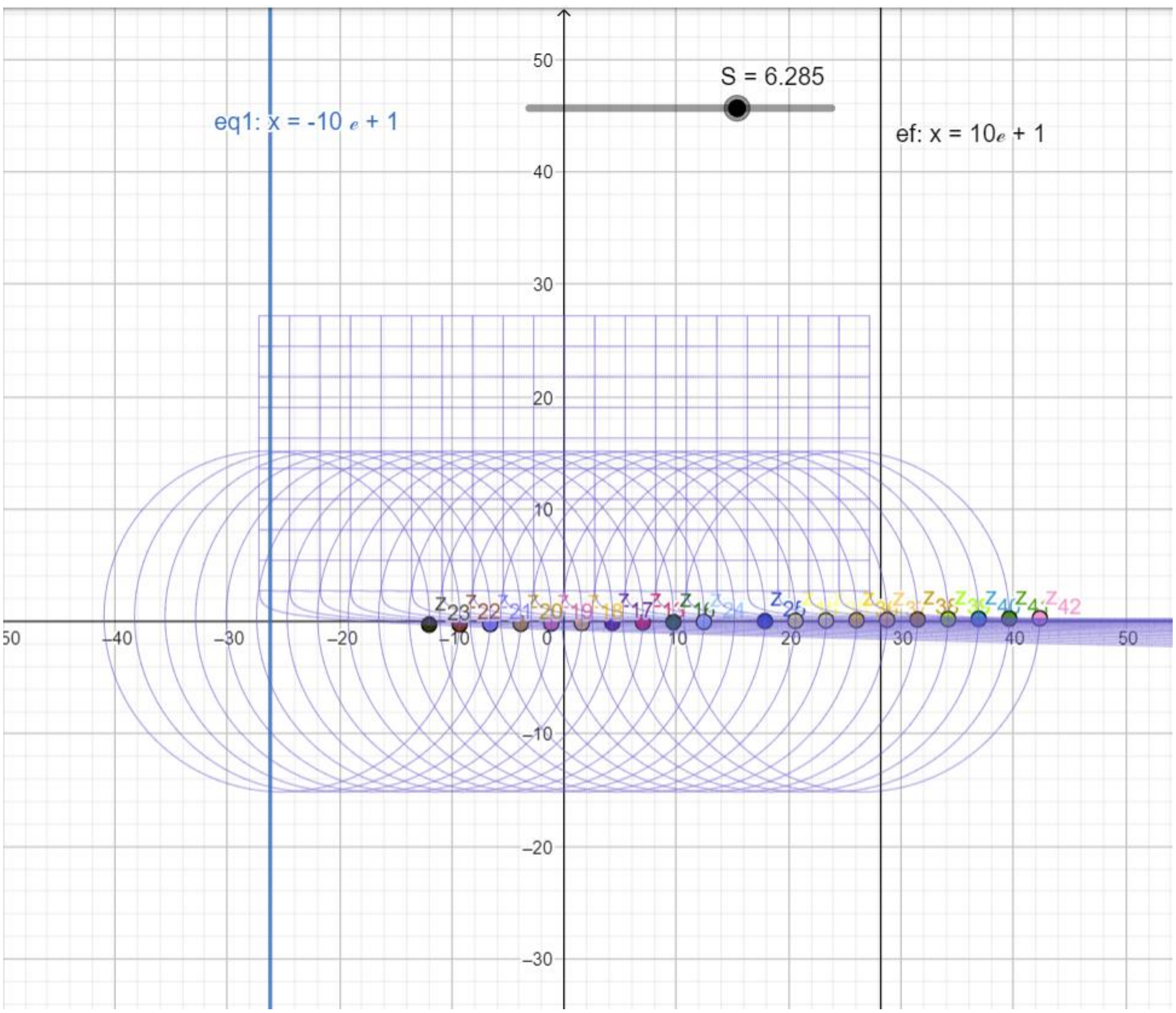
$$e^{i} = 0.5403023058681 + 0.8414709848079i$$

$$c = \frac{360}{57.295779513085}$$

$\rightarrow$ 6.2831853071793

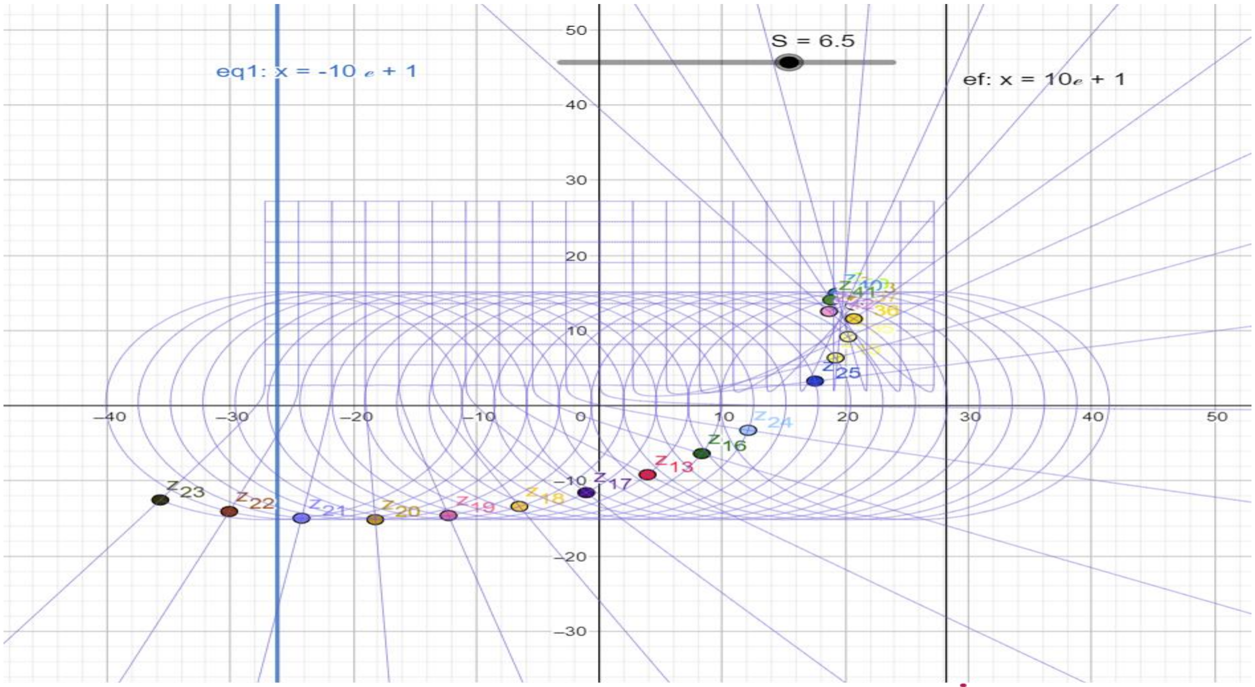
$$\alpha = \cos^{-1}(0.5403023058681)$$

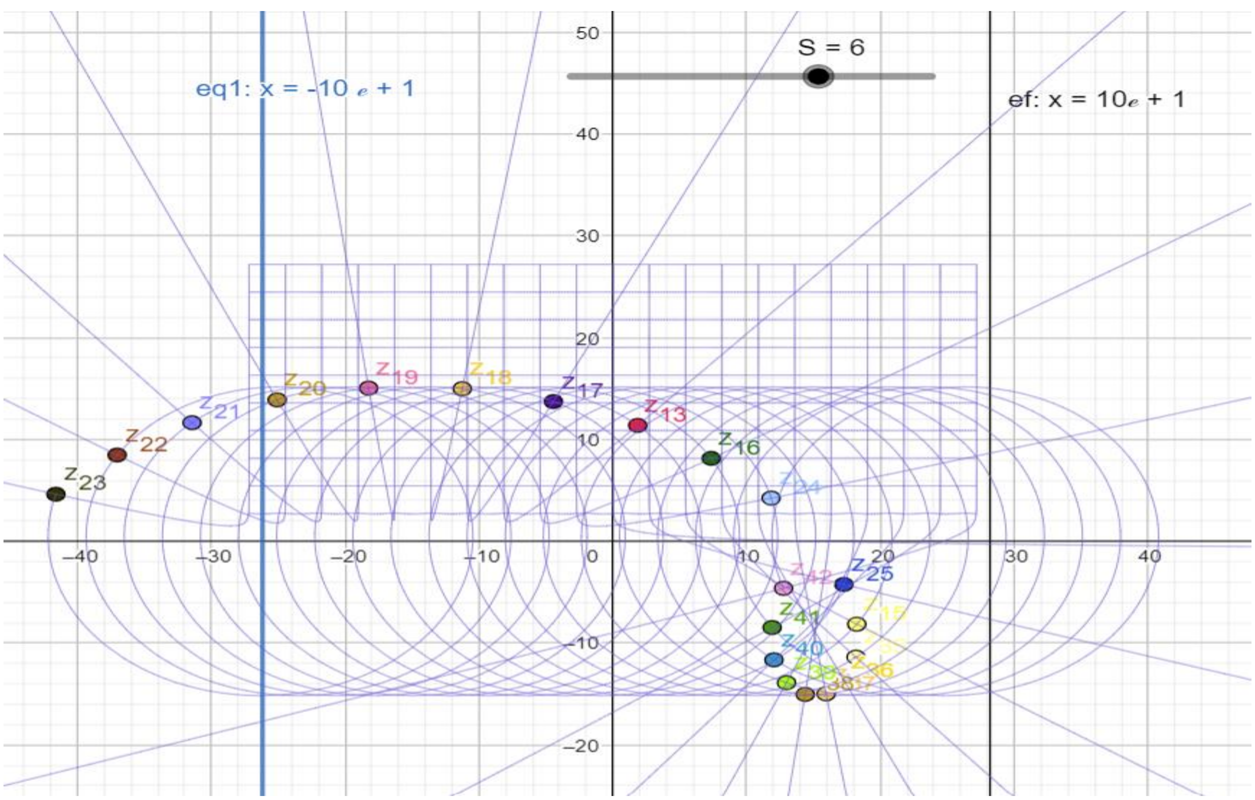
$\rightarrow$ 57.295779513085°



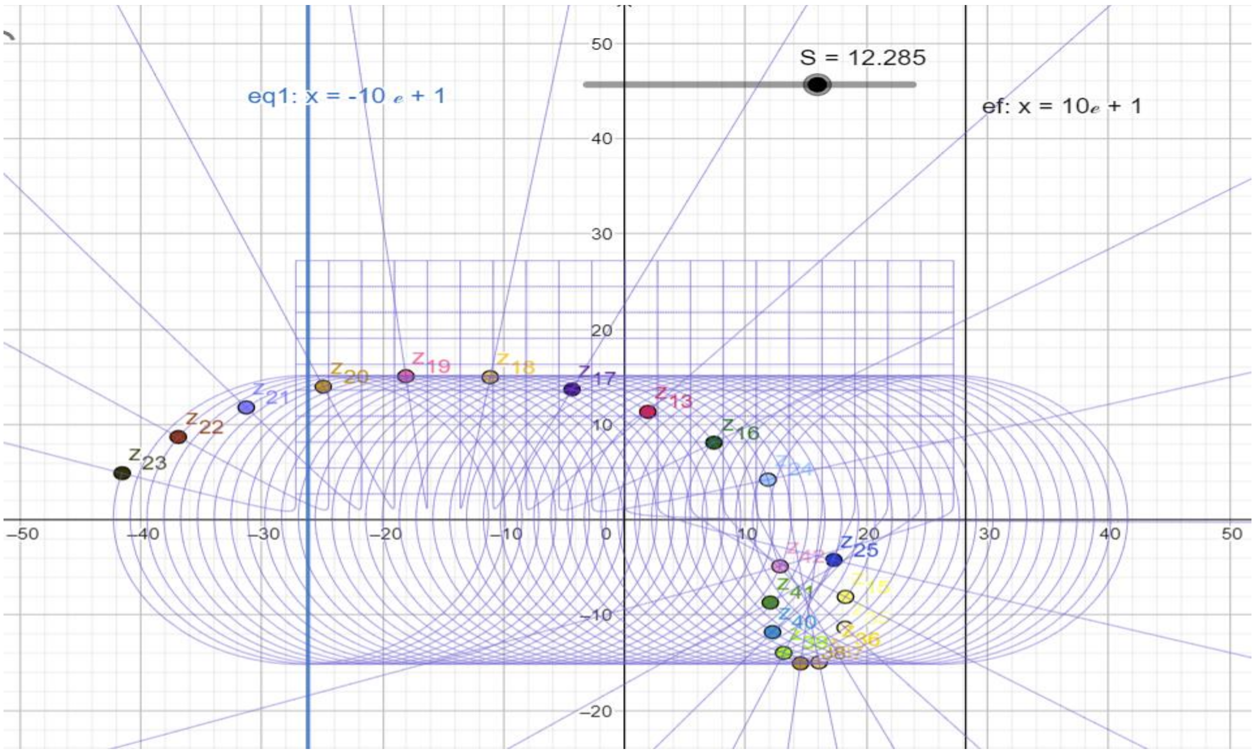
23 – Flipping Signs at [S] approximate to 6.5

$\left(-e * x + e^{-(i*x*S-e)}\right)$; $S = 6.5$ $Sign\ opposite\ of\ the\ sign\ at\ S = 6$

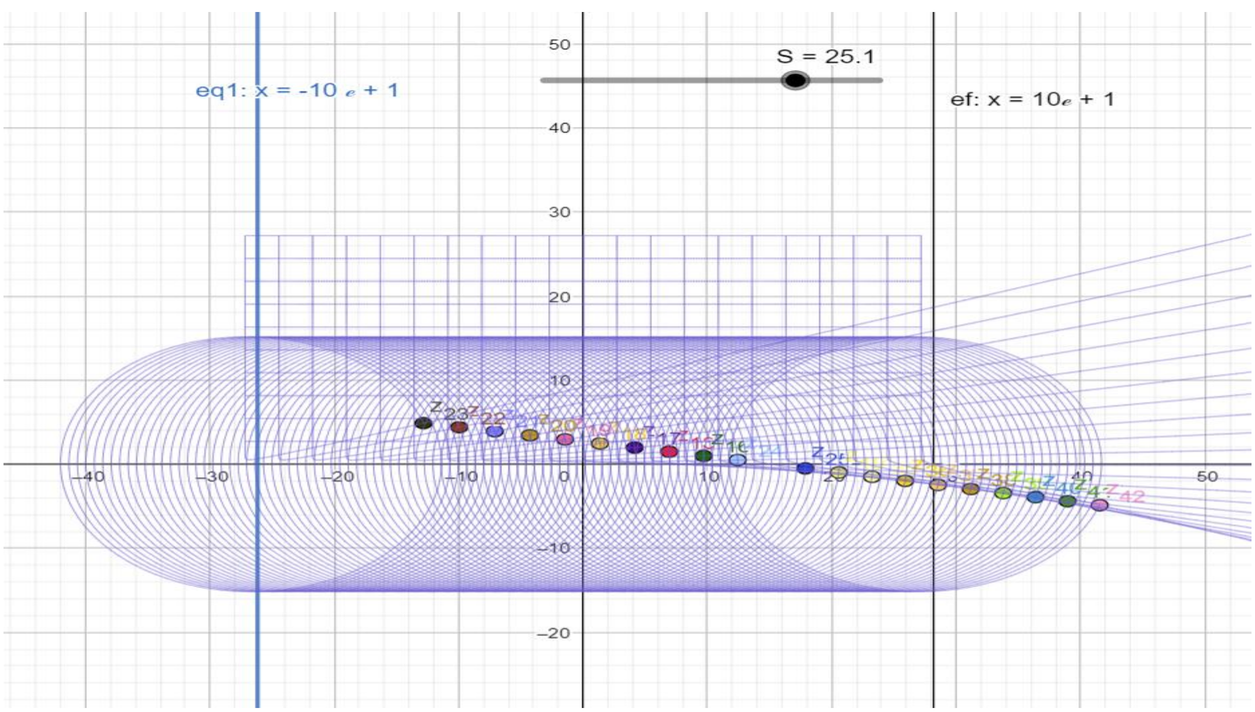




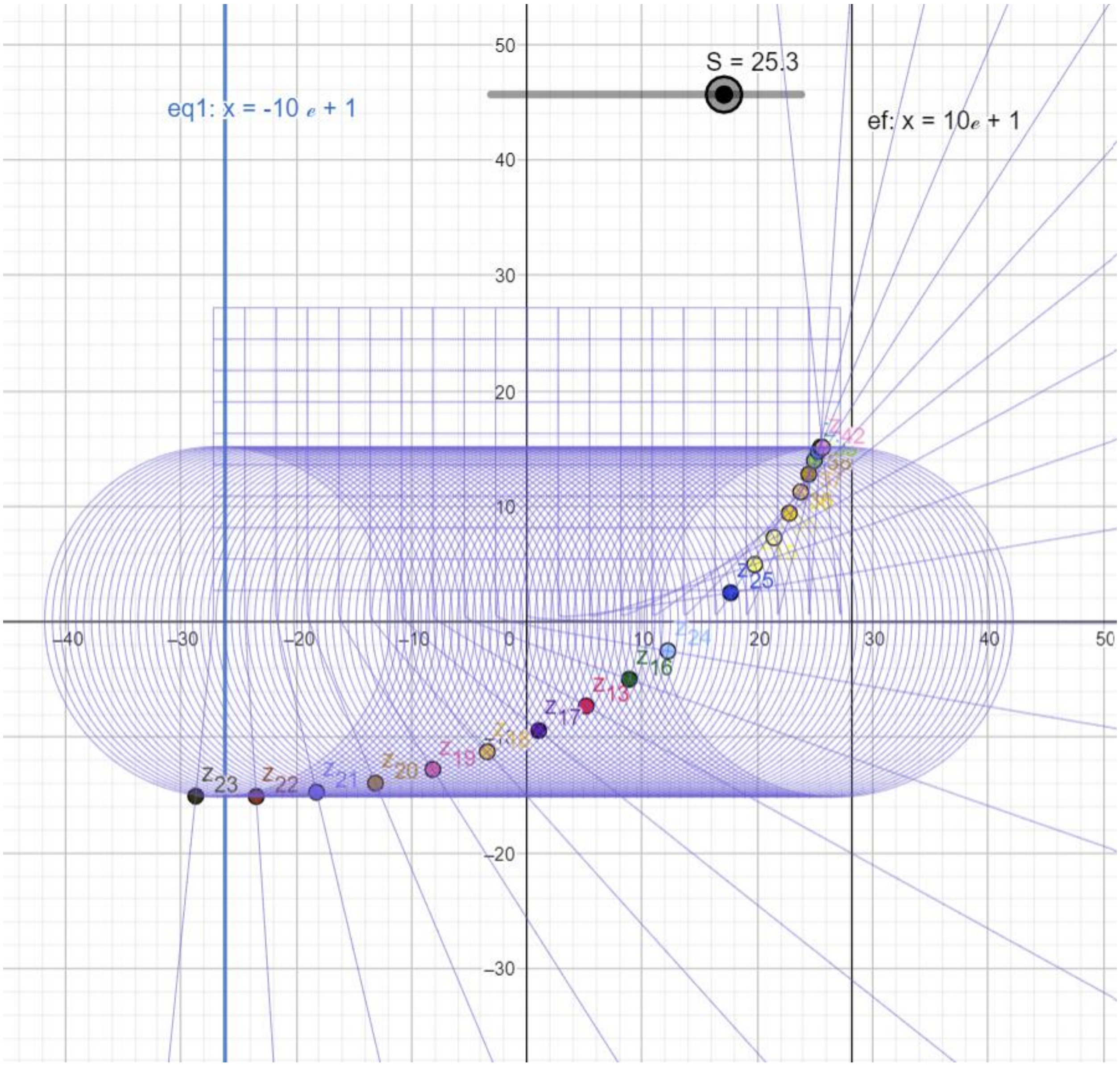
24 - $\left(-e * x + e^{-(i*x*S-e)}\right)$; $S = 12.285$ *Second* Synchronization point between all numbers



25- $\left(-e * x + e^{-(i*x*S-e)}\right)$; $S > 25.1$ *third* Synchronization Flip point between all numbers

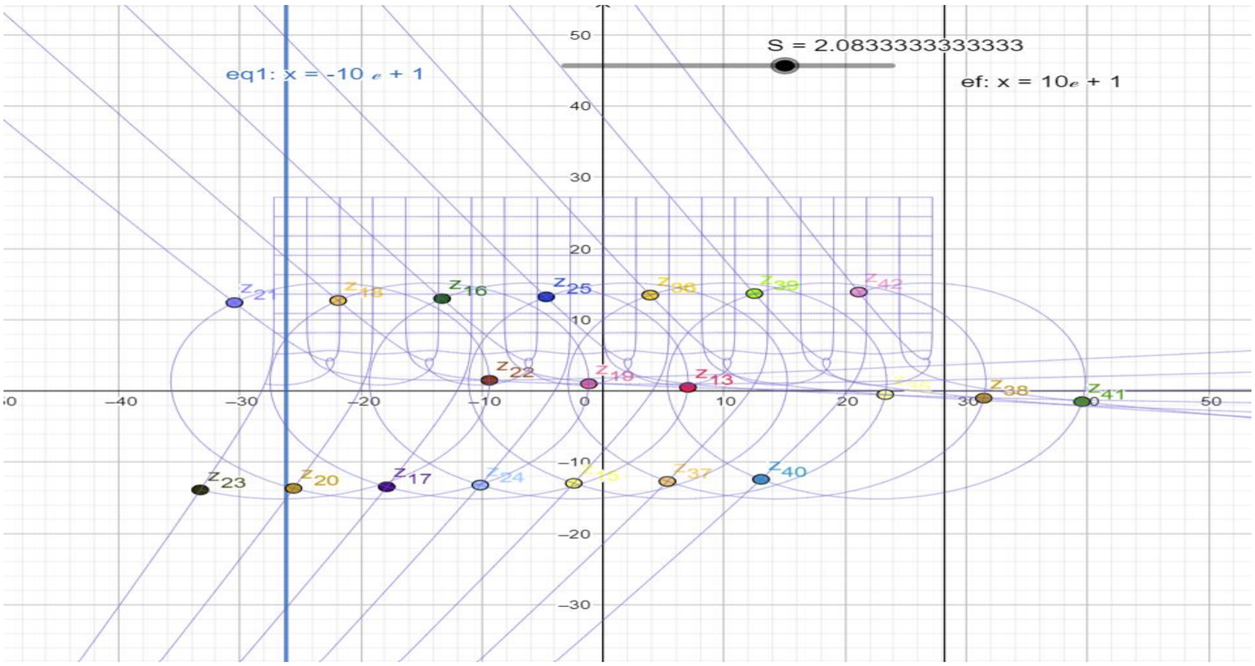


25- $\left(-e * x + e^{-(i*x*S-e)}\right)$; $S = 25.3$ *third* Synchronization point between all numbers

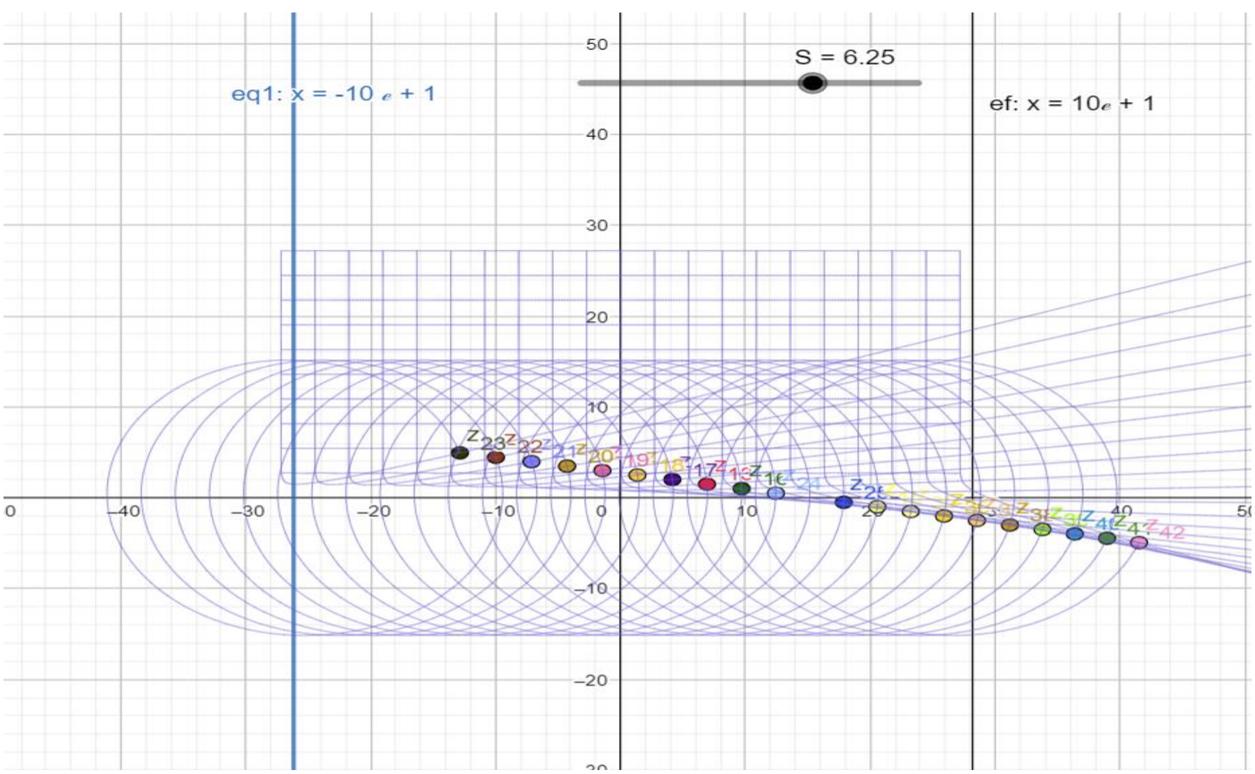


26 – Synchronization formula (with Seed 12.5)

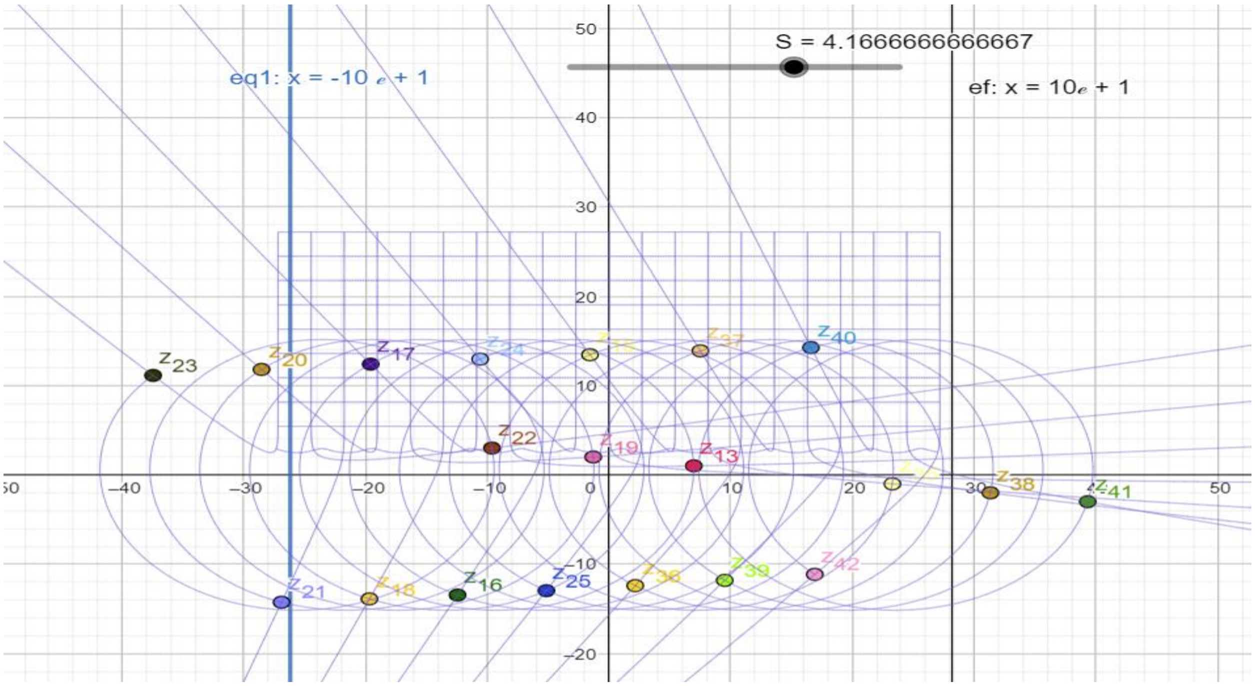
$$\left(-e * x + e^{-(i*x*S-e)}\right);\ S = \frac{12.5}{6} = 2 + \frac{1}{12} = 2.083333333333333$$



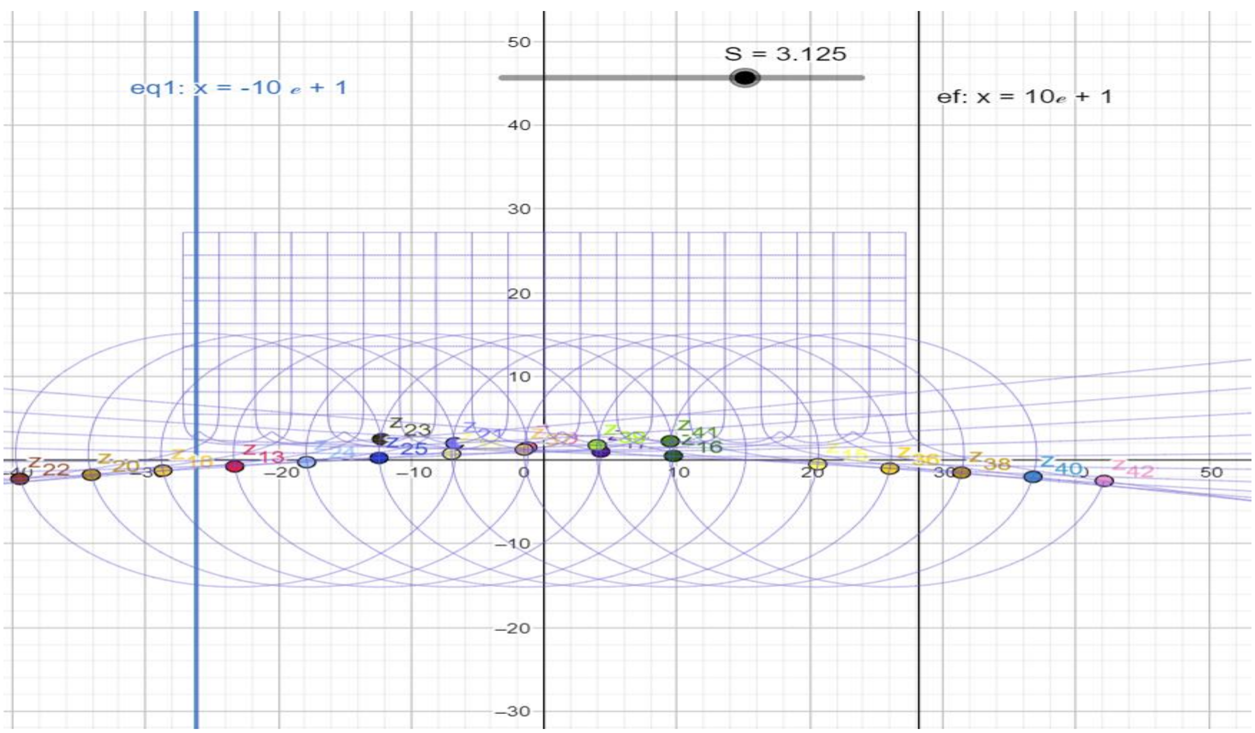
$$\left(-e * x + e^{-(i*x*S-e)}\right);\ S = \frac{12.5}{2} = 6 + \frac{1}{4} = 6.25$$



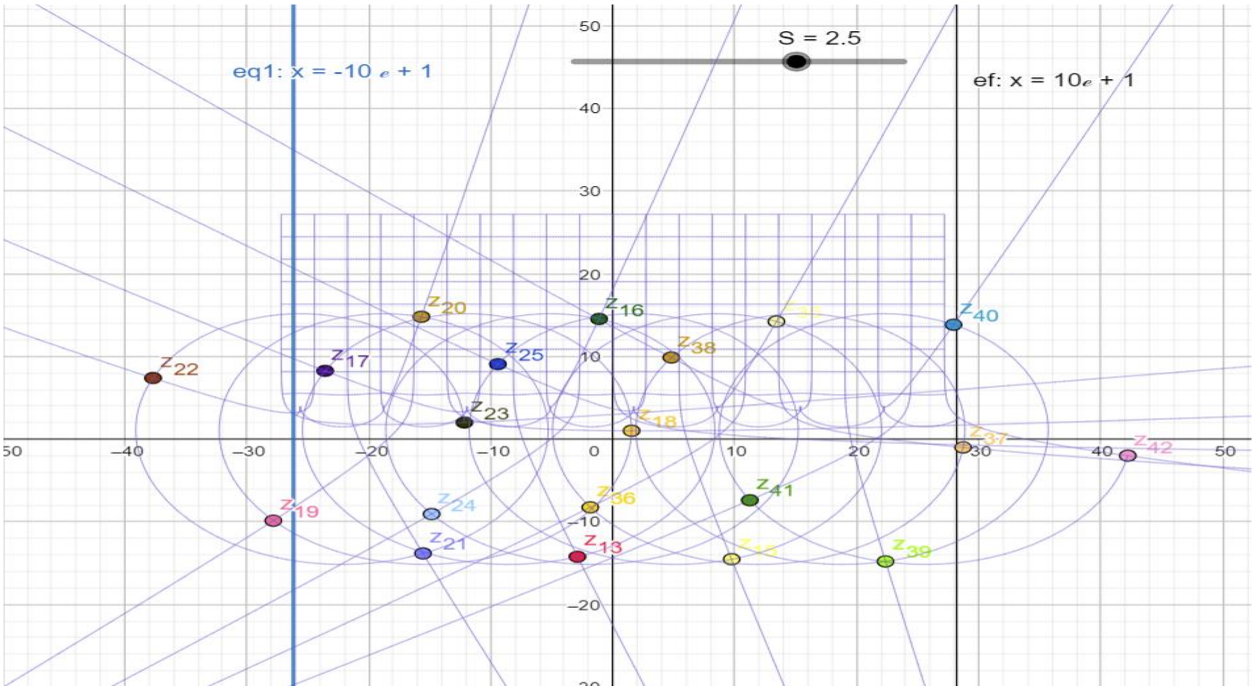
$$\left(-e * x + e^{-(i*x*S-e)}\right);\ S = \frac{12.5}{3} = 4 + \frac{1}{6} = 4.1666666666667$$



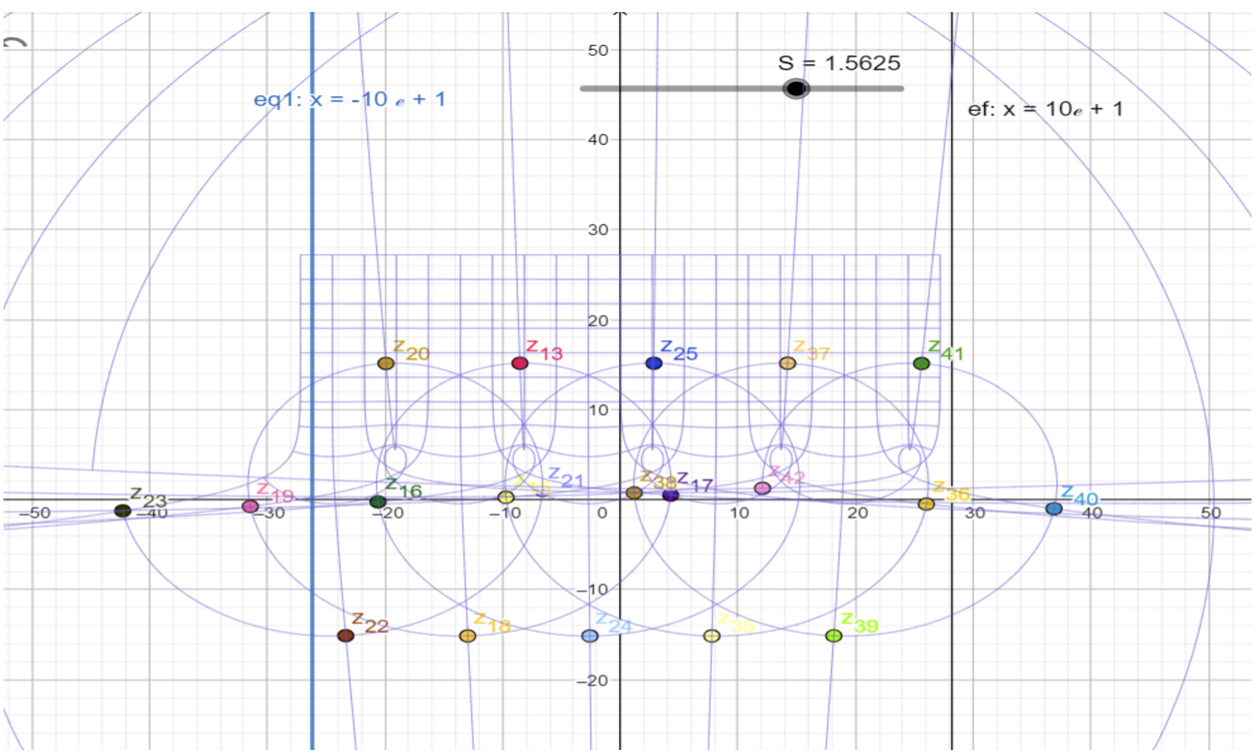
$$\left(-e * x + e^{-(i*x*S-e)}\right);\ S = \frac{12.5}{4} = 3 + \frac{1}{8} = 3.125$$



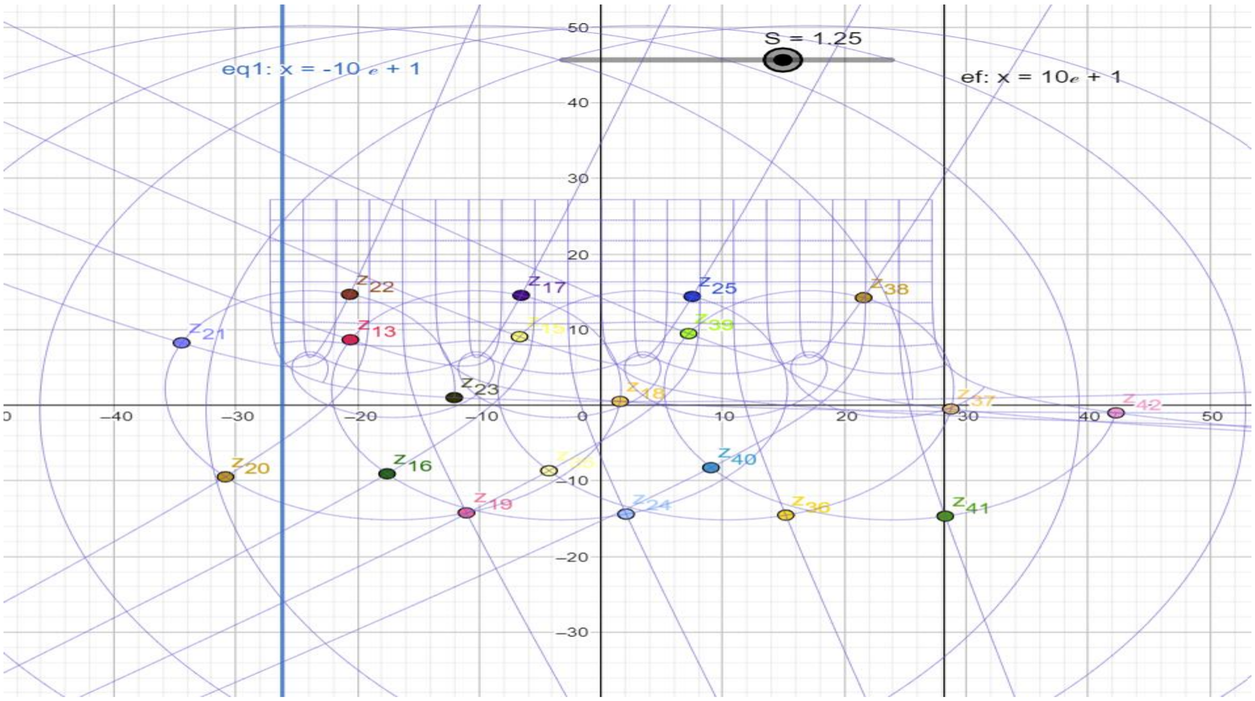
$$\left(-e * x + e^{-(i*x*S-e)}\right);\;\; S = \frac{12.5}{5} = 2 + \frac{1}{2} = 2.5$$



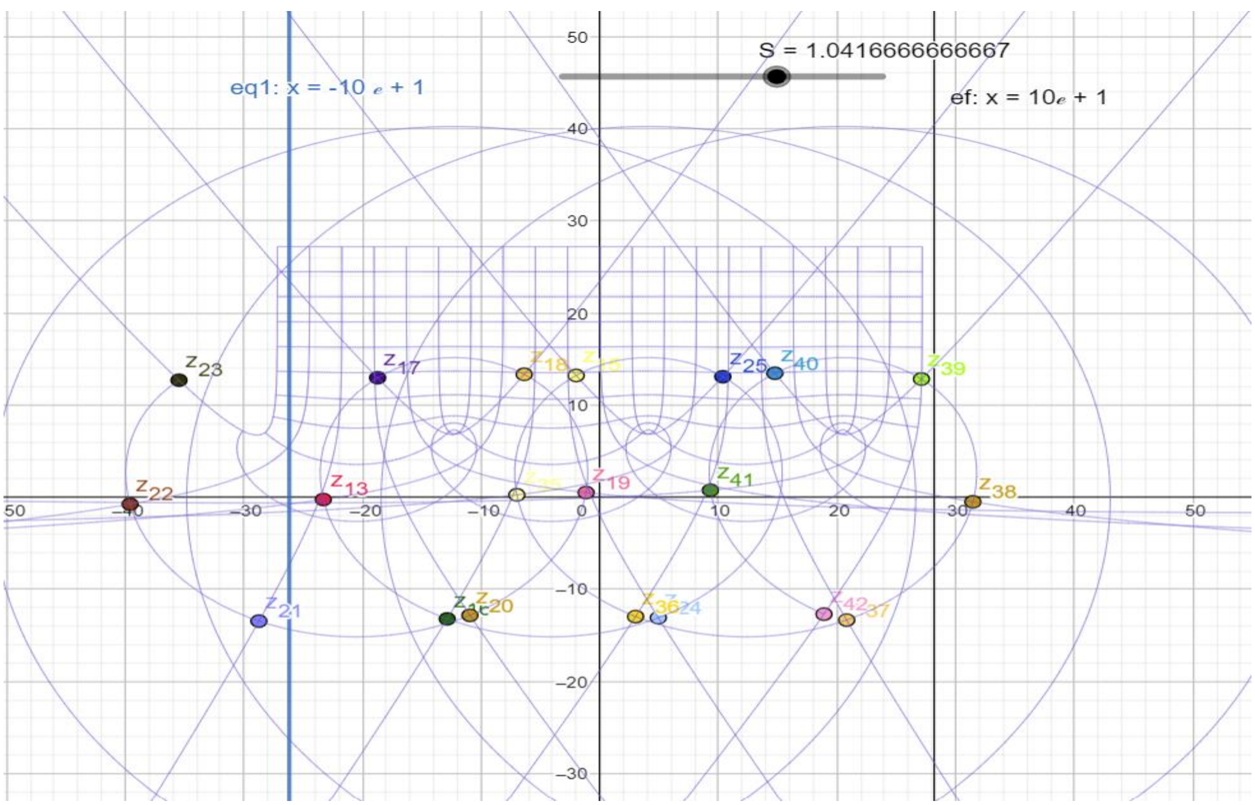
$$\left(-e * x + e^{-(i*x*S-e)}\right);\;\; S = \frac{12.5}{8} = 1 + \frac{1}{2} + \frac{1}{16} = 1.5625$$



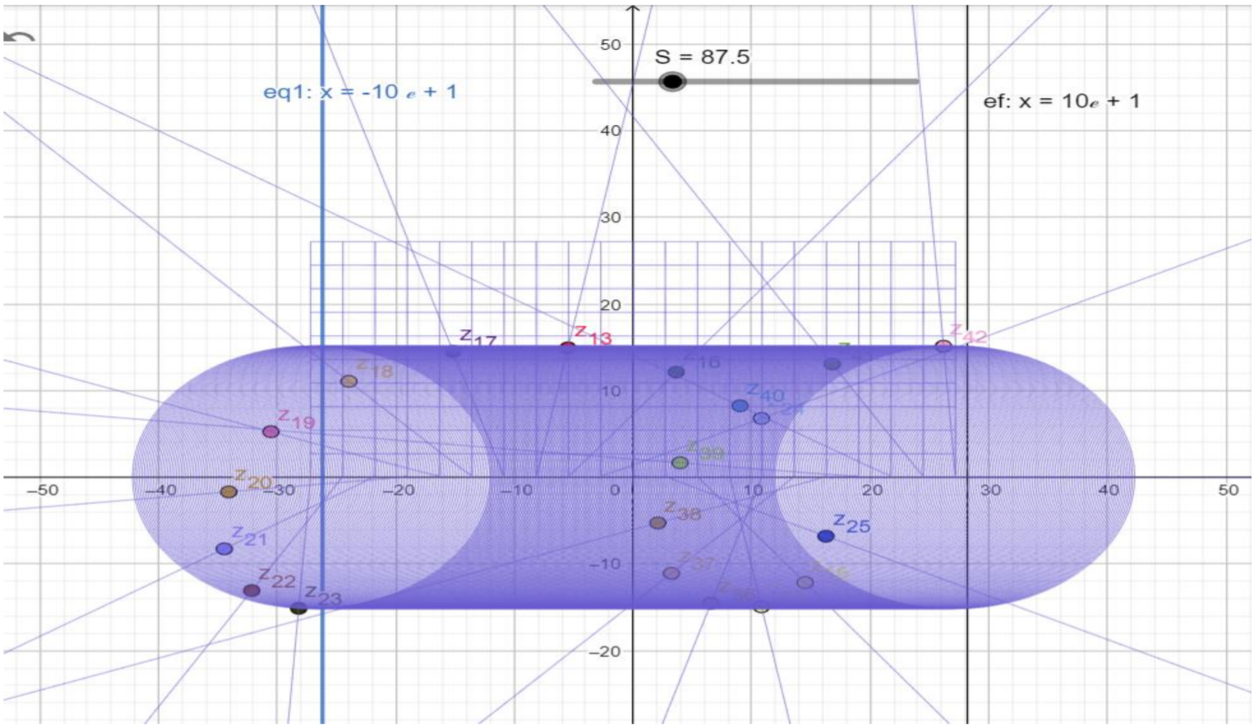
$$\left(-e * x + e^{-(i * x * S - e)}\right);\ S = \frac{12.5}{10} = 1 + \frac{1}{4} = 1.25$$



$$\left(-e * x + e^{-(i * x * S - e)}\right);\ S = \frac{12.5}{12} = 1 + \frac{1}{24} = 1.04166666667$$



$$S = 12.5 * Odd\ number\ = Odd\ number + 0.5$$



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 [π] 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,*

Mathematics for Machine Learning: Linear Algebra; by Imperial College London; Taught by: David Dye, Professor of Metallurgy Department of Materials

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