New Odd Numbers Identity and The None-trivial Zeros of Zeta Function

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

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New Odd Numbers Identity and The None-trivial Zeros of Zeta Function

Abstract

This paper is going to introduce a new identity unit circle function for complex plane specific for odd numbers.

Second, we are going to show some properties of these new unit Identity function.

Third, use this new unit Identity function to study the distribution of odd roots for sin term in zeta function but using the new identity function not Euler Identity to explain Riemann conjunction about the critical strip line and the none-trivial zeros along Re(S) = 0.5.

Riemann's functional equation

$$\zeta(s) = 2^s \pi^{s-1} \sin\left(\frac{\pi s}{2}\right) \Gamma(1-s)\, \zeta(1-s).$$

The Riemann zeta function on the critical line can be written

$$\zeta\left(\frac{1}{2}+it\right) = e^{-i\theta(t)} Z(t),$$

$$Z(t) = e^{i\theta(t)} \zeta\left(\frac{1}{2}+it\right).$$

Then Zeta function will be zero

1- At $\sin\left(\frac{\pi s}{2}\right)$ is Zero for any complex number S.

2- If exponential term is zero also when S = S + 0.5 where S is any complex number.

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

1. Introduction

A) First, we are going to introduce this function as a new Identity function for odd number in a complex plane.

our objective will be to proof using this new Identity function that all odd numbers including prime numbers will make sin

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

$$f(x) = z^x = \left(\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}}\right)^x$$

$$f(x) = \left(\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}}\right)^x = Cos(x\,\theta) + i\,Sin(x\,\theta)$$

$$f(x) = (\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}})^{0.5} = Cos(22.5) + \ i\,Sin(\ 22.5)$$
$$= 0.9238795325113 + 0.38268343236511$$

$$Cos\left(\frac{\pi}{8} * 2 * X\right) = Sin\left(\frac{\pi}{8} * (2 * X + 4)\right)$$

$$Cos\left(\frac{\pi}{2} * \frac{X}{2}\right) = Sin(\frac{\pi}{2} * (\frac{X}{2} + 1))$$

$$Cos\left(\frac{\pi}{2} * \frac{X}{2}\right) = Sin(\frac{\pi}{4} * (X + \frac{1}{2}))$$

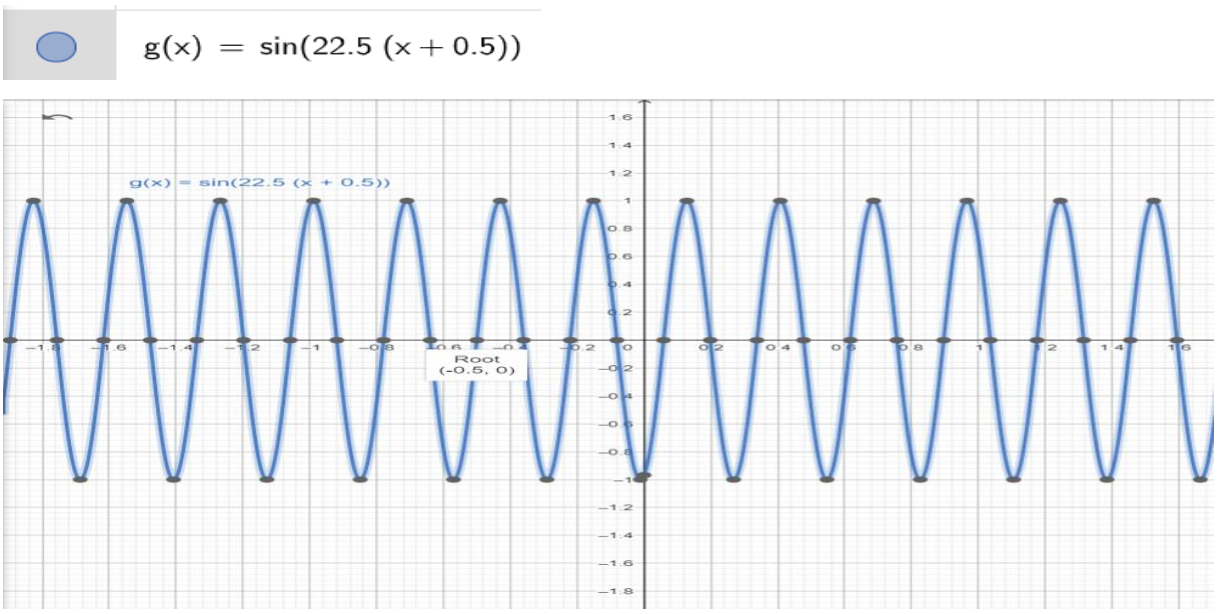
$$Cos\left(\frac{\pi}{2} * \frac{X - 0.5}{2}\right) = Sin(\frac{\pi}{4} * (X - \frac{1}{2}))$$

I) If we used angel degrees instead of rad degree (π = 180º), and X = X ± 0.5 and θ = 22.5º THEN Sin will have Root at (0.5,0)

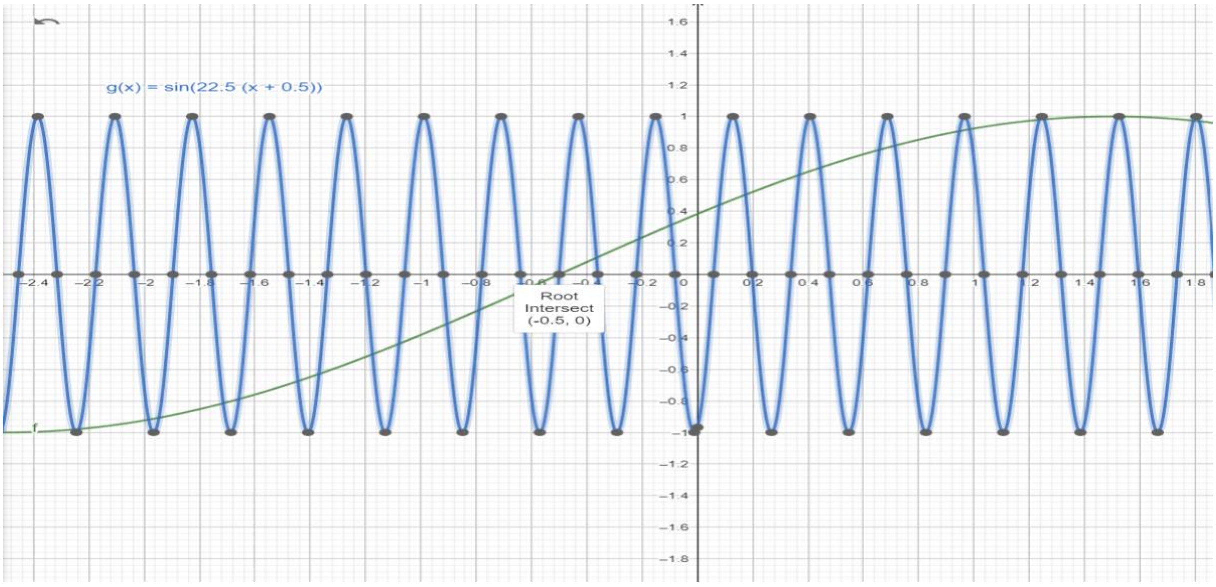
II) When X = X - 0.5 all Odd numbers will be negative Roots integers for Sin function

III) When X = X + 0.5 all Odd numbers will be postive Roots for Sin function

IV) $For\ Sin(22.5 * \ (X + 0.5)\ );\ there\ will\ be\ Y = \frac{\pm 1}{\sqrt{2}}\ ;for\ X = \pm 0.5$



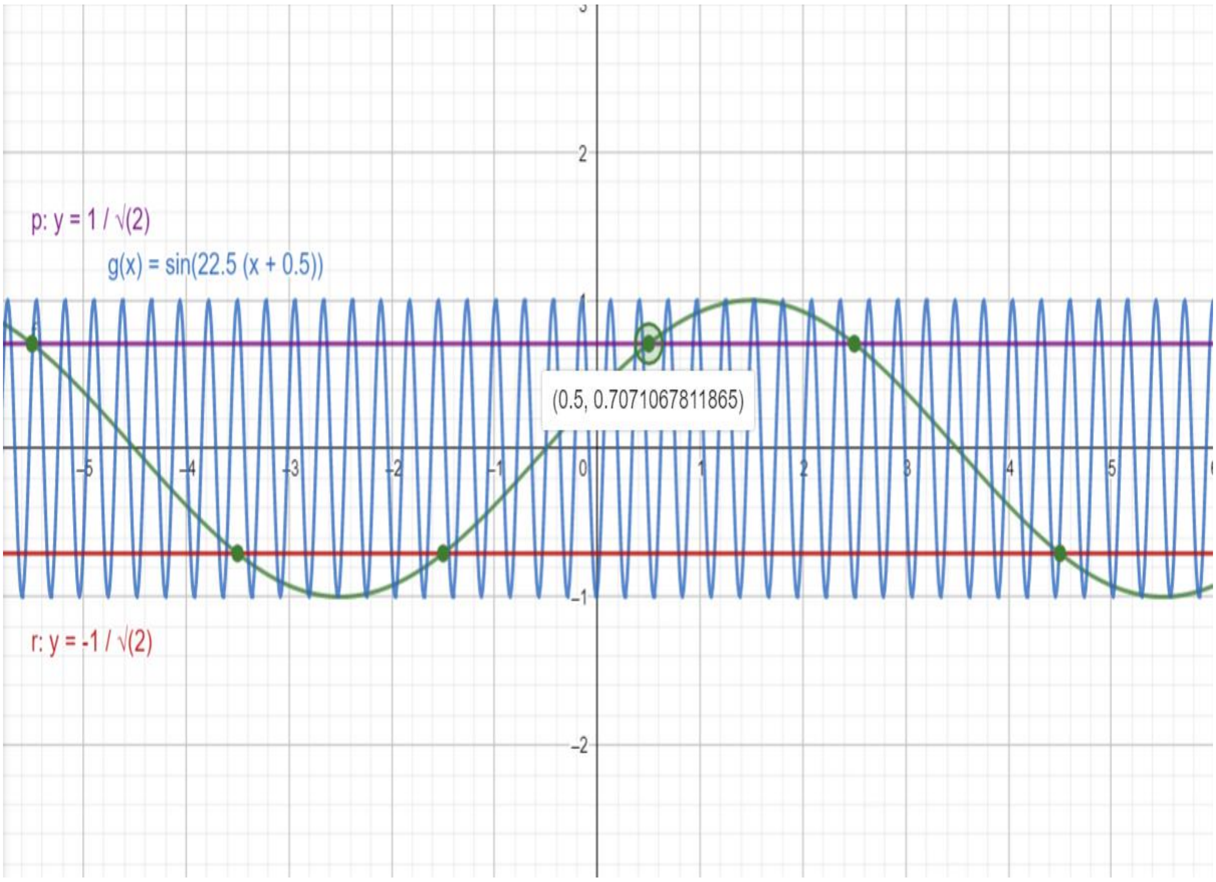
$$f(x) = \sin\left(\frac{\pi}{4}\,(x+0.5)\right)$$



F(X) will be equal to = { $\frac{\pm 1}{\sqrt{2}}$ } for any X = X + 0.5 including the odd numbers

x	f(x)
-19.5	-0.707106781...
-17.5	-0.707106781...
-15.5	0.7071067811...
-13.5	0.7071067811...
-11.5	-0.707106781...
-9.5	-0.707106781...
-7.5	0.7071067811...
-5.5	0.7071067811...
-3.5	-0.707106781...
-1.5	-0.707106781...
0.5	0.7071067811...
2.5	0.7071067811...
4.5	-0.707106781...
6.5	-0.707106781...

1 - if X = [-19.5 , 20] with step = 2; we get only two values = $\{\frac{\pm 1}{\sqrt{2}}\}$



So if we mulitply f(x) by $= \frac{\pm 1}{\sqrt{2}}$ then Q(X) qill be = {0.5 , -0.5} all the time for odd numbers.

$a = \sin(45°) - \frac{1}{\sqrt{2}}$

$\rightarrow 0$

$b = \sin\left(\frac{\pi}{4}\right) \sin\left(\frac{\pi}{4}\right)$

$\rightarrow 0.5$

$q(x) = \sin\left(\frac{\pi}{4}\,(x + 0.5)\right) \sin(45°)$

$f(x) = \sin\left(\frac{\pi}{4}\,(x + 0.5)\right)$

x	f(x)	s(x)	q(x)
-11.5	-0.707106781...	0	-0.5
-9.5	-0.707106781...	-1	-0.5
-7.5	0.7071067811...	0	0.5
-5.5	0.7071067811...	1	0.5
-3.5	-0.707106781...	0	-0.5
-1.5	-0.707106781...	-1	-0.5
0.5	0.7071067811...	0	0.5
2.5	0.7071067811...	1	0.5
4.5	-0.707106781...	0	-0.5
6.5	-0.707106781...	-1	-0.5
8.5	0.7071067811...	0	0.5
10.5	0.7071067811...	1	0.5
12.5	-0.707106781...	0	-0.5
14.5	-0.707106781...	-1	-0.5
16.5	0.7071067811...	0	0.5

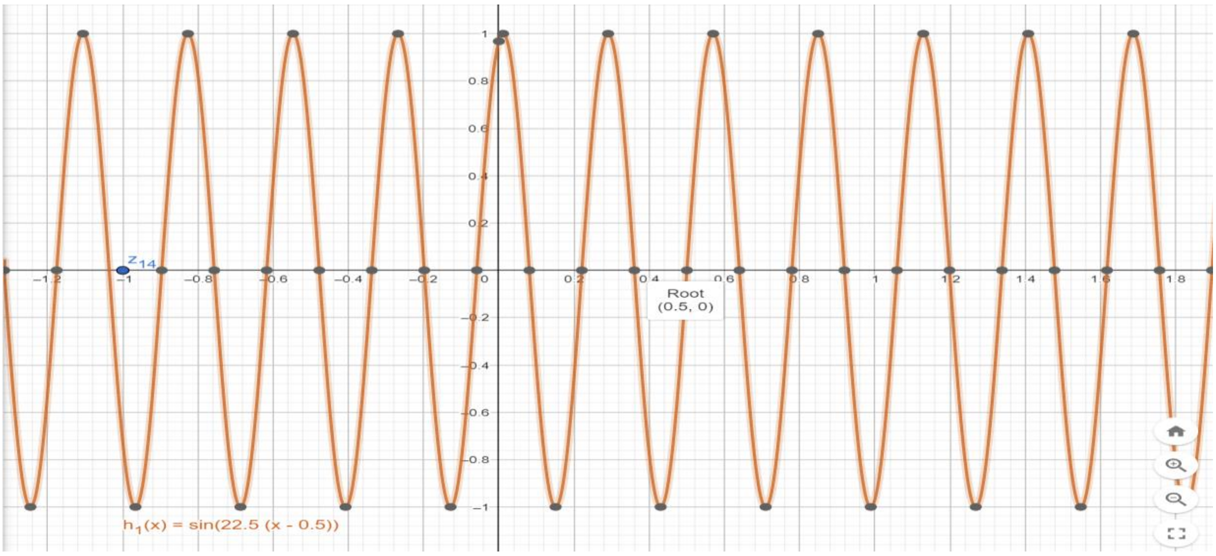
1 - if X = [-19.5 , 20] with step = 1; so adding or removing 0.5 for any X;
F(x) and S(x) = { 0, -1 , 1, 1/sqrt(2) , -1/sqrt(2)} , both functions are the same but one have all Odd roots negative and the other have all Odd roots Positive

$$f(x) = \sin\left(\frac{\pi}{4}\,(x + 0.5)\right) \qquad s(x) = \sin\left(\frac{\pi}{4}\,(x - 0.5)\right)$$

x	f(x)	s(x)
-9.5	-0.707106781...	-1
-8.5	0	-0.707106781...
-7.5	0.7071067811...	0
-6.5	1	0.7071067811...
-5.5	0.7071067811...	1
-4.5	0	0.7071067811...
-3.5	-0.707106781...	0
-2.5	-1	-0.707106781...
-1.5	-0.707106781...	-1
-0.5	0	-0.707106781...
0.5	0.7071067811...	0
1.5	1	0.7071067811...
2.5	0.7071067811...	1
3.5	0	0.7071067811...
4.5	-0.707106781	0

2- Similar reslts if X = X -0.5

$$h(x) = \sin(22.5\,(x - 0.5))$$

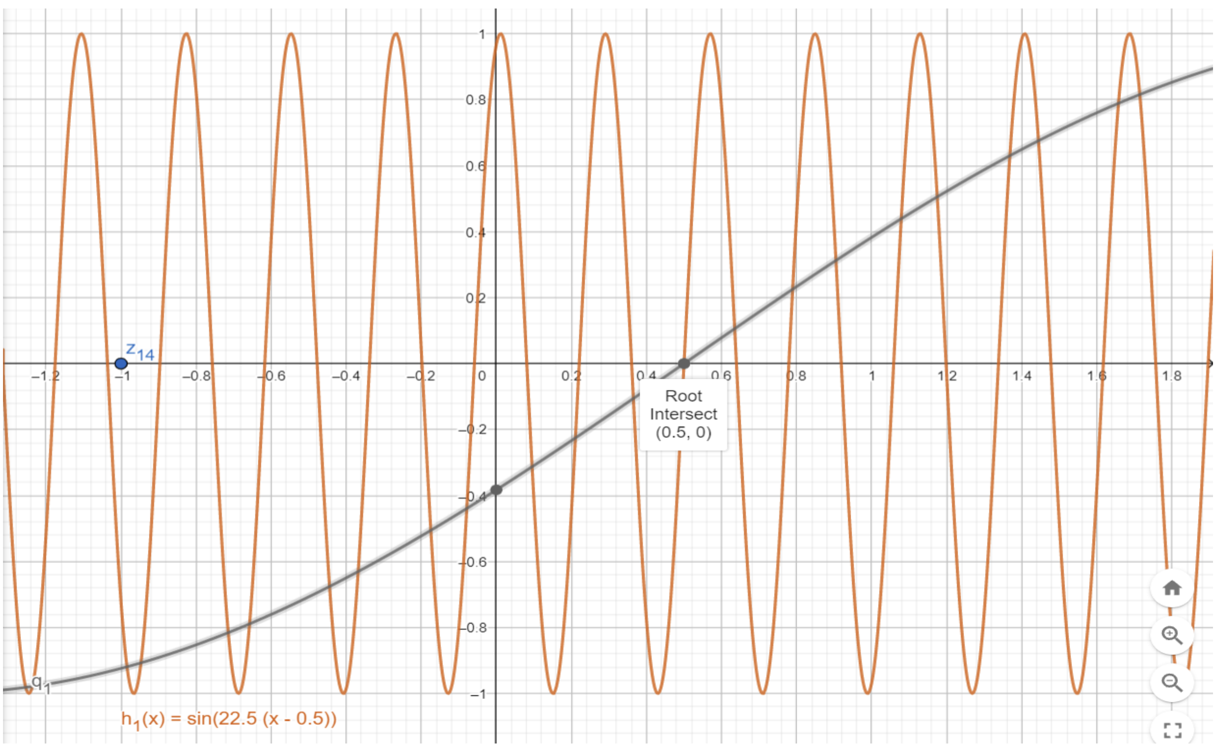


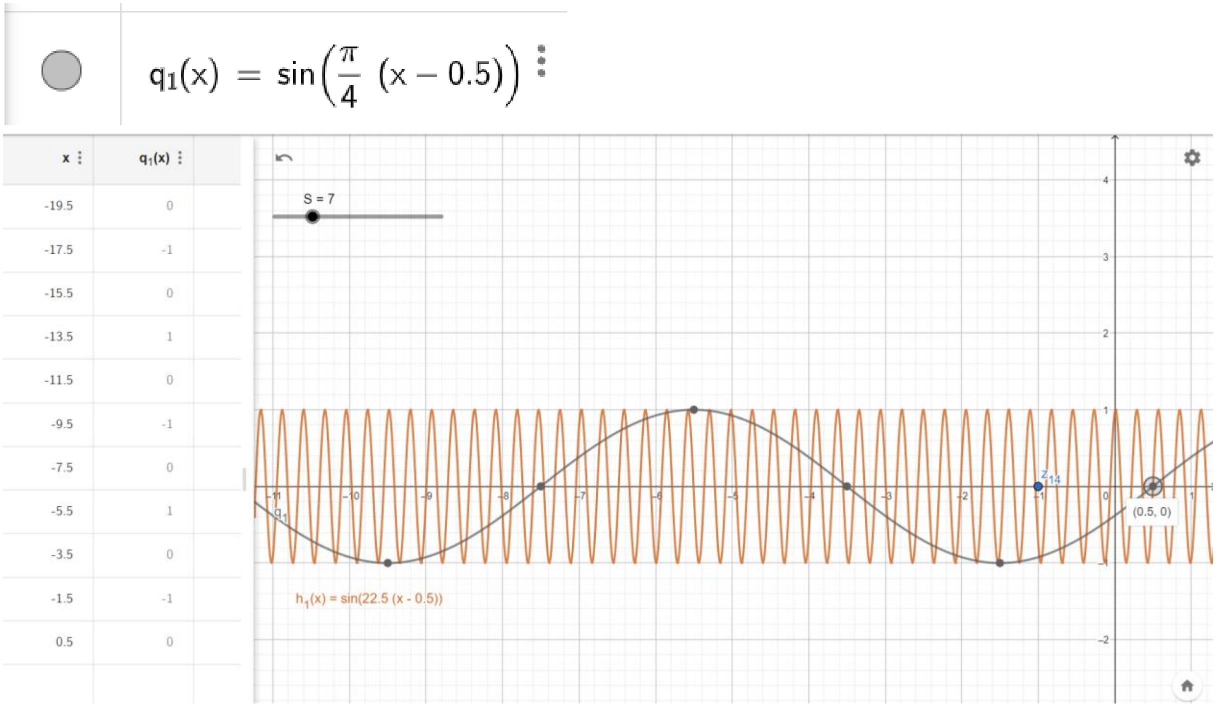
$$q_1(x) = \sin\left(\frac{\pi}{4}\,(x - 0.5)\right)$$

$$w = \sin(202.5°)$$

$\rightarrow$ -0.3826834323651

y-intercept
(0, -0.3826834323651)





- Q1(X) = 0 at X = { 0.5,-3.5 , -7.5 , -11.5, -15.4,…..} ; with step = 4
- And Q1(X) = { i , -i} at X={-1.5 , -5.5 , -9.5, -13.5, -17.5, …..} with step = 4

  We will see later how to make Q1(X) = 0 for all Odd numbers.

1- For any X = X ±0.5

   Then zeta functional Sin() term, will be moving in term of θ = 22.5º and will hav rootse for all odd numbers with value = 1/sqrt(2)

   Zeta functional sin() term will intersect withY at point sin(θ = 22.5º) = 0.38268343236509

2- Sin() term in zeta function at X = X + 0.5 will equal to = { 0.5 , -0.5} if we multiply it by by $= \frac{\pm 1}{\sqrt{2}}$

   or Sin(45º). And in complex plane multiplication means rotation. Which means if we rorate our complex plane axis by 45º

3- Because sin() term in Zeta function have 90º with S; but we are going to replace it by S = S + 0.5

   we converted the engel into 45º which made all odd numbers sin() are with value $= \frac{\pm 1}{\sqrt{2}}$ which is

   Acutally due to 45º rotation done when we tranfered S = S + 0.5. by this angel all odd numbers landed on rotated axis by 45º.

$$Cos\left(\frac{\pi}{8} * 2 * X\right) = Sin\left(\frac{\pi}{8} * (2 * X + 4)\right)$$

$$Cos\left(\frac{\pi}{2} * \frac{X}{2}\right) = Sin(\frac{\pi}{2} * (\frac{X}{2} + 1))$$

$$Cos\left(\frac{\pi}{2} * \frac{X}{2}\right) = Sin(\frac{\pi}{4} * (X + \frac{1}{2}))$$

In the rest of the document we are goin to see the distribution odd roots on our new odd Identity function and how it explaines the distribution of the roots for Sin() term in Zeta function.

B) Odd Identity unit Circle function Properties

$$f(x) = (\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}})^x = Cos(x\,\theta) + \,i\,Sin(\,x\,\theta)$$

This f(x) is like Euler's Identity but for odd numbers. We will call it odd Identity unit Circle.

1- equivalent to the complex plane unit circle. And Euler's Identity $e^{i\pi} + 1 = 0$

2- odd Identity unit Circle f(X) axis, rotates 45 degrees from the original complex plane axis X, Y.

3- this f(Z) Odd Identity unit circle axis is Y =X and Y =-X, which means if X = e then Y = e or Y =-e

4- this odd Identity unit circle function intersects with Y = X and Y =-X at square root of two.

5- This Odd Identity unit circle function intersects with 4 axis (2 original and 2 rotated), in 8 points. {1, -1, i, -i, sqrt (2), -sqrt (2)}

6- every cycle of 8 integer values for x, we start new cycle of same values of f(x). first cycle starts at X =0, second cycle starts at X =8.

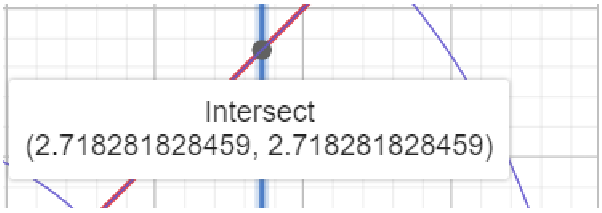
x	$f(z) = z^x \;=\; (\frac{1}{\sqrt{2}} + i\,\frac{1}{\sqrt{2}})^x$
0	1+0i
1	$\frac{1}{\sqrt{2}} + i\,\frac{1}{\sqrt{2}}$
2	i
3	$\frac{-1}{\sqrt{2}} + i\,\frac{1}{\sqrt{2}}$
4	-1+0i
5	$\frac{-1}{\sqrt{2}} + i\,\frac{-1}{\sqrt{2}}$
6	-i
7	$\frac{1}{\sqrt{2}} + i\,\frac{-1}{\sqrt{2}}$
8 -→ end of one cycle	1+0i
9	$\frac{1}{\sqrt{2}} + i\,\frac{1}{\sqrt{2}}$
10	….

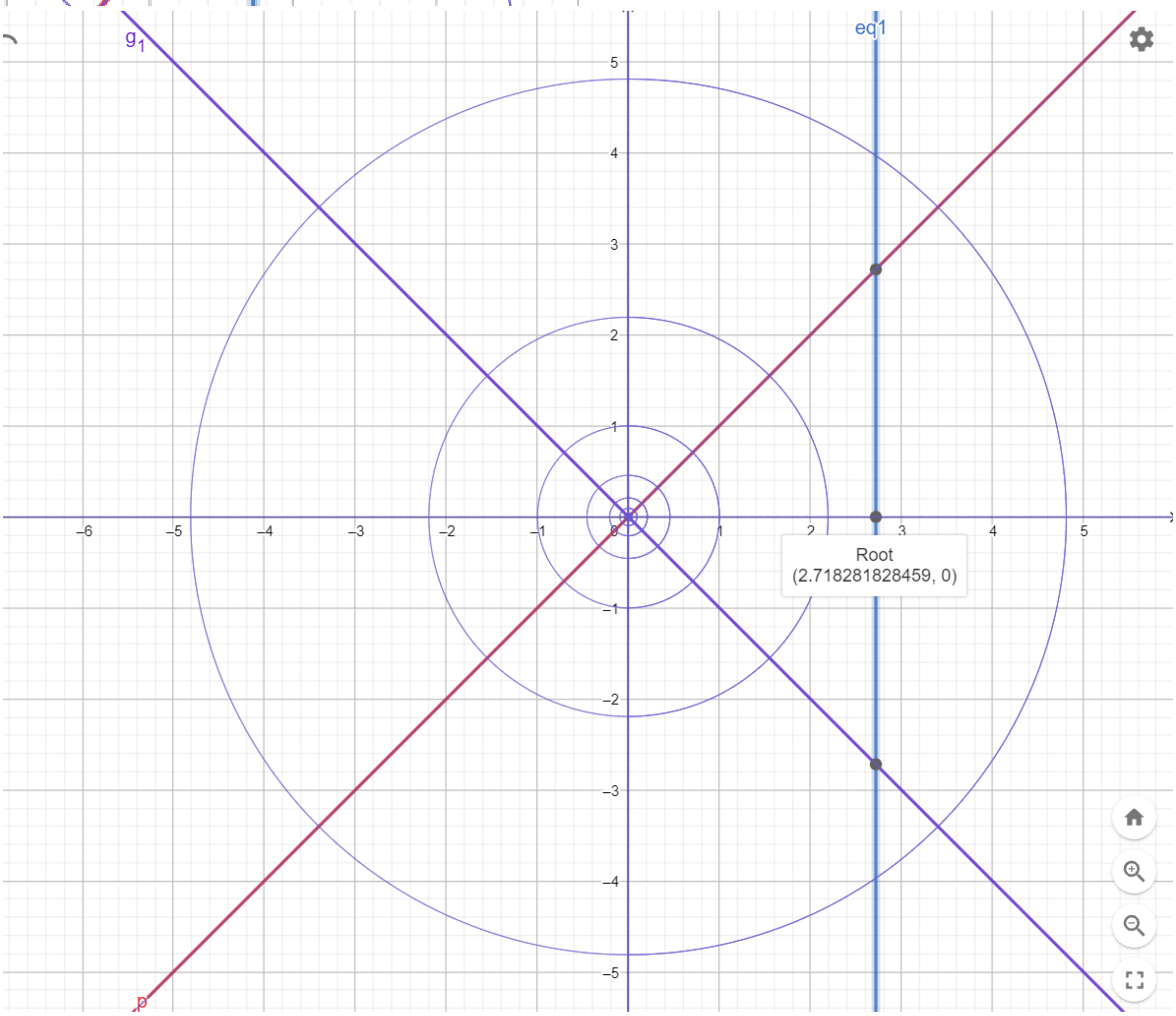
7- For any even integer values for X; f(X) value will be on original complex plane axis. And any odd integer values of X; f(X) value will be a complex number on the odd Identity unit circle axis which are the new rotated axis (45 degrees).

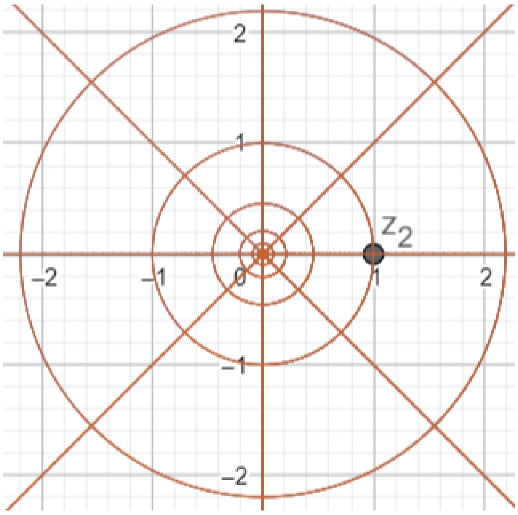
$$f(x) = z^x \;=\; \left(\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}}\right)^x$$

$$for\ all\ odd\ values\ of\ x, \qquad f(x) = \pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}}$$

Which means all values of f(X) will be on the new odd Identity unit Circle; where Cos(45) = Sin(45) = 1/sqrt(2).





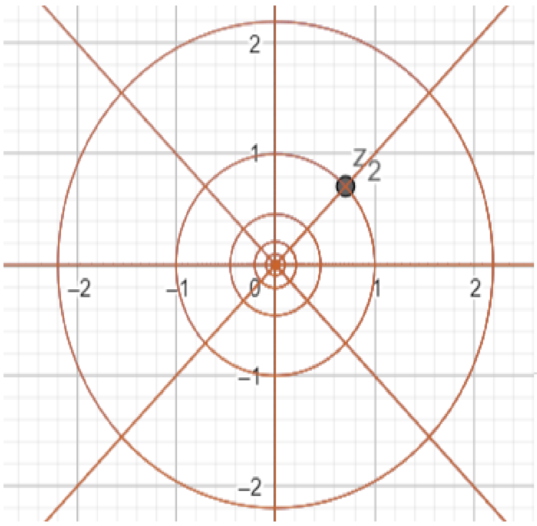


$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$

$\rightarrow 1 + 0i$

$w = S$

$\rightarrow 0$

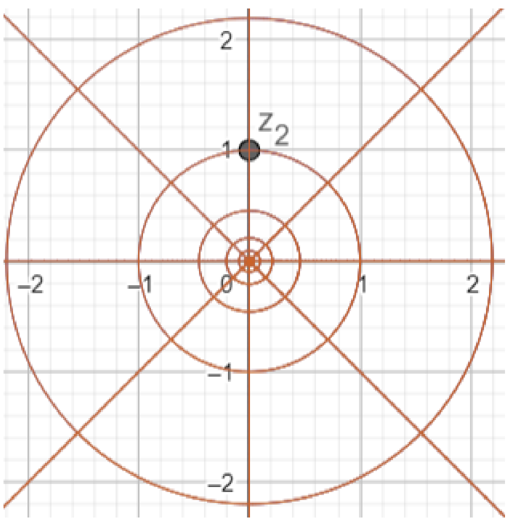


$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$

$\rightarrow 0.7071067811865 + 0.7071067811865i$

$w = S$

$\rightarrow 1$

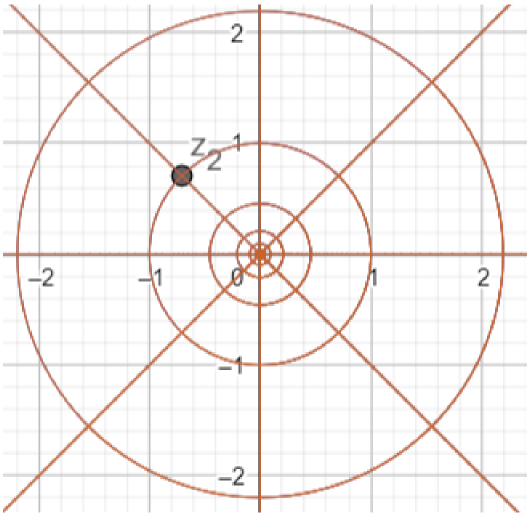


$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$

$\rightarrow 1i$

$w = S$

$\rightarrow 2$

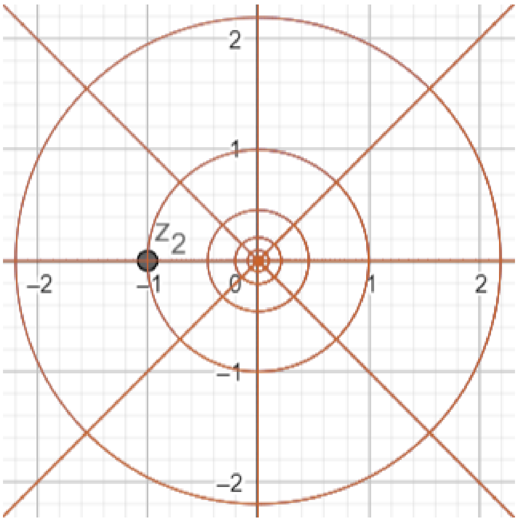


$$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$$

$\rightarrow$ -0.7071067811865 + 0.7071067811865i

$w = S$

$\rightarrow$ 3

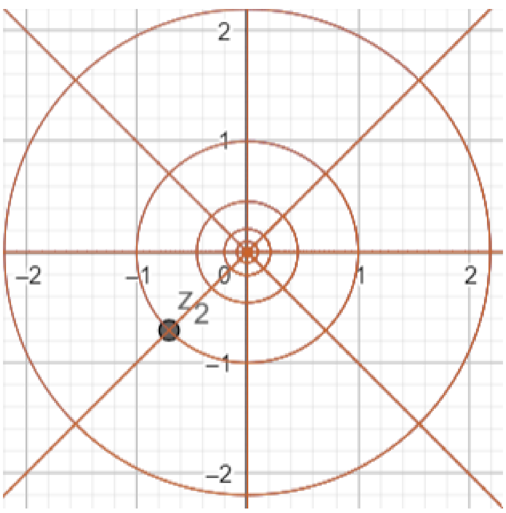


$$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$$

$\rightarrow$ -1 + 0i

$w = S$

$\rightarrow$ 4

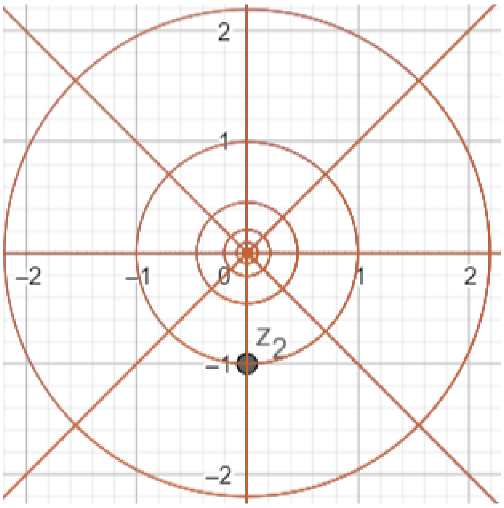


$$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$$

$\rightarrow$ -0.7071067811865 - 0.7071067811865i

$w = S$

$\rightarrow$ 5

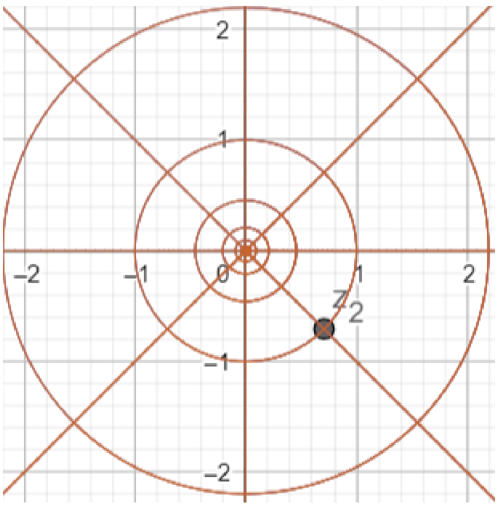


$$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$$

$\rightarrow$ 0 - ί

$w = S$

$\rightarrow$ 6

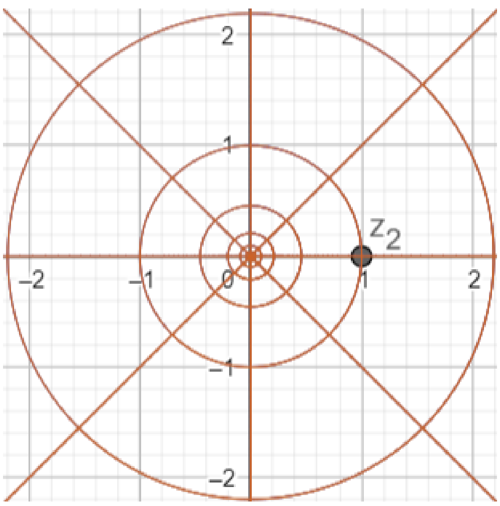


$$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$$

$\rightarrow$ 0.7071067811865 - 0.7071067811865ί

$w = S$

$\rightarrow$ 7



$$z_2 = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^S$$

$\rightarrow$ 1 - 0ί

$w = S$

$\rightarrow$ 8

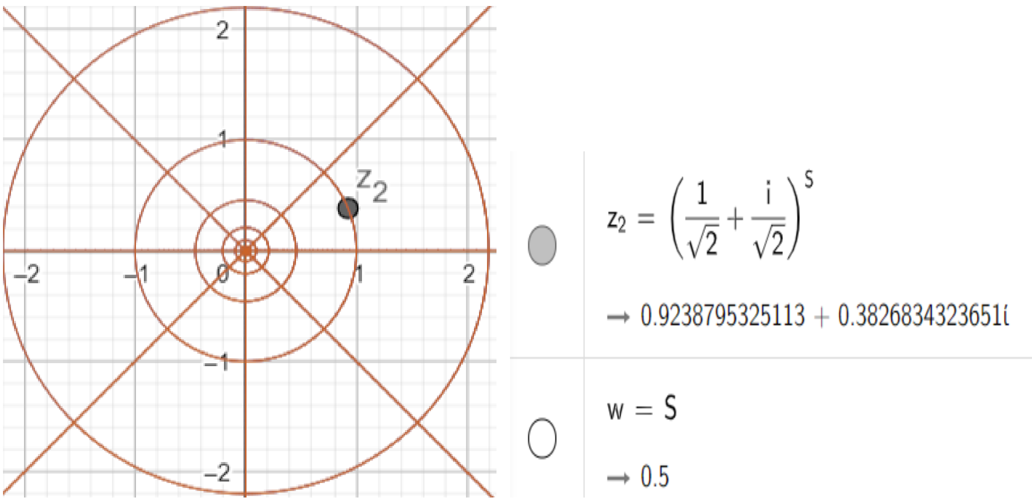
A) F(X) for all real values of X

$$f(x) = z^x \;=\; (\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}})^x$$

1- for all real values of x, then f(X) value will be any point on the odd Identity unit Circle. Where odd Identity unit Circle origin (0,0) but the axis is rotated by 45 degrees.

$$f(x) = (\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}})^x = Cos(x\,\theta) + \;i\,Sin(\,x\,\theta)$$

2- for x = S = 0.5, THEN θ = 22.5º, because at x = 1, was θ = 45º



$$f(x) = (\pm\frac{1}{\sqrt{2}} \pm i\,\frac{1}{\sqrt{2}})^{0.5} = Cos(22.5) + \;i\,Sin(\,22.5)$$

3- one property for this θ = 22.5º and Sin (22.5) and Cos (22.5)

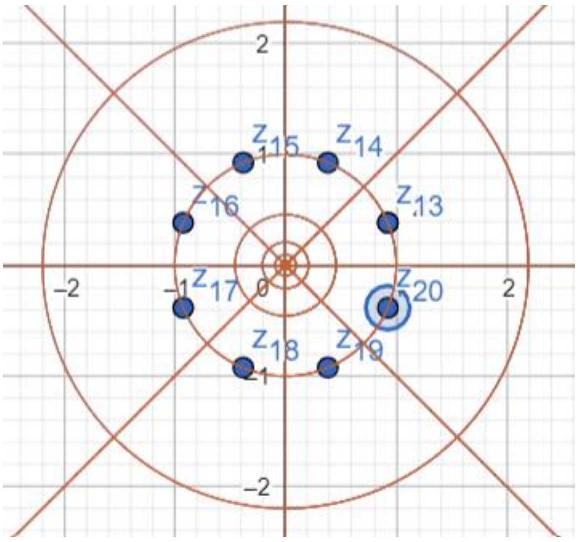
$$Cos\left(\frac{\pi}{8} * 2 * X\right) = Sin\left(\frac{\pi}{8} * (2 * X + 4)\right)$$

$$Cos\left(\frac{\pi}{2} * \frac{X}{2}\right) = Sin(\frac{\pi}{2} * (\frac{X}{2} + 1))$$

$$Cos\left(\frac{\pi}{2} * \frac{X}{2}\right) = Sin(\frac{\pi}{4} * (X + \frac{1}{2}))$$

4- every cycle cover 8 values for x. one cycle starts at X= 0.5 and θ=22.5 and ends at X =8, θ=360 new cycle of same values of f(x).

x	θ	$f(x) = z^x = (\pm\frac{1}{\sqrt{2}} \pm i\ \frac{1}{\sqrt{2}})^x$
0.5	22.5	$Cos(22.5) + i\,Sin(22.5) = 0.9238795325113 + 0.3826834323651i$
1.5	67.5	$Cos(67.5) + i\,Sin(67.5) = 0.3826834323651 + 0.9238795325113i$
2.5	112.5	$Cos(112.5) + i\,Sin(112.5) = -0.3826834323651 + 0.9238795325113i$
3.5	157.5	$Cos(135) + i\,Sin(135) = -0.9238795325113 + 0.3826834323651i$
4.5	202.5	$Cos(202.5) + i\,Sin(202.5) = -0.9238795325113 - 0.3826834323651i$
5.5	247.5	$Cos(247.5) + i\,Sin(247.5) = -0.3826834323651 - 0.9238795325113i$
6.5	292.5	$Cos(292.5) + i\,Sin(292.5) = 0.3826834323651 - 0.9238795325113i$
7.5	337.5	$Cos(337.5) + i\,Sin(337.5) = 0.9238795325113 - 0.3826834323651\,i$
8	360	1-0 i
8.5	382.5	$Cos(382.5) + i\,Sin(382.5) = 0.9238795325113 + 0.3826834323651\,i$
9.5	427.5	…….



$z_{13} = \cos(22.5°) + i\ \sin(22.5°)$

$\rightarrow 0.9238795325113 + 0.3826834323651i$

$z_{14} = \cos(67.5°) + i\ \sin(67.5°)$

$\rightarrow 0.3826834323651 + 0.9238795325113i$

$z_{15} = \cos(112.5°) + i\ \sin(112.5°)$

$\rightarrow -0.3826834323651 + 0.9238795325113i$

$z_{16} = \cos(157.5°) + i\ \sin(157.5°)$

$\rightarrow -0.9238795325113 + 0.3826834323651i$

$z_{17} = \cos(202.5°) + i\ \sin(202.5°)$

$\rightarrow -0.9238795325113 - 0.3826834323651i$

$z_{18} = \cos(247.5°) + i\ \sin(247.5°)$

$\rightarrow -0.3826834323651 - 0.9238795325113i$

$z_{19} = \cos(292.5°) + i\ \sin(292.5°)$

$\rightarrow 0.3826834323651 - 0.9238795325113i$

$z_{20} = \cos(337.5°) + i\ \sin(337.5°)$

$\rightarrow 0.9238795325113 - 0.3826834323651i$

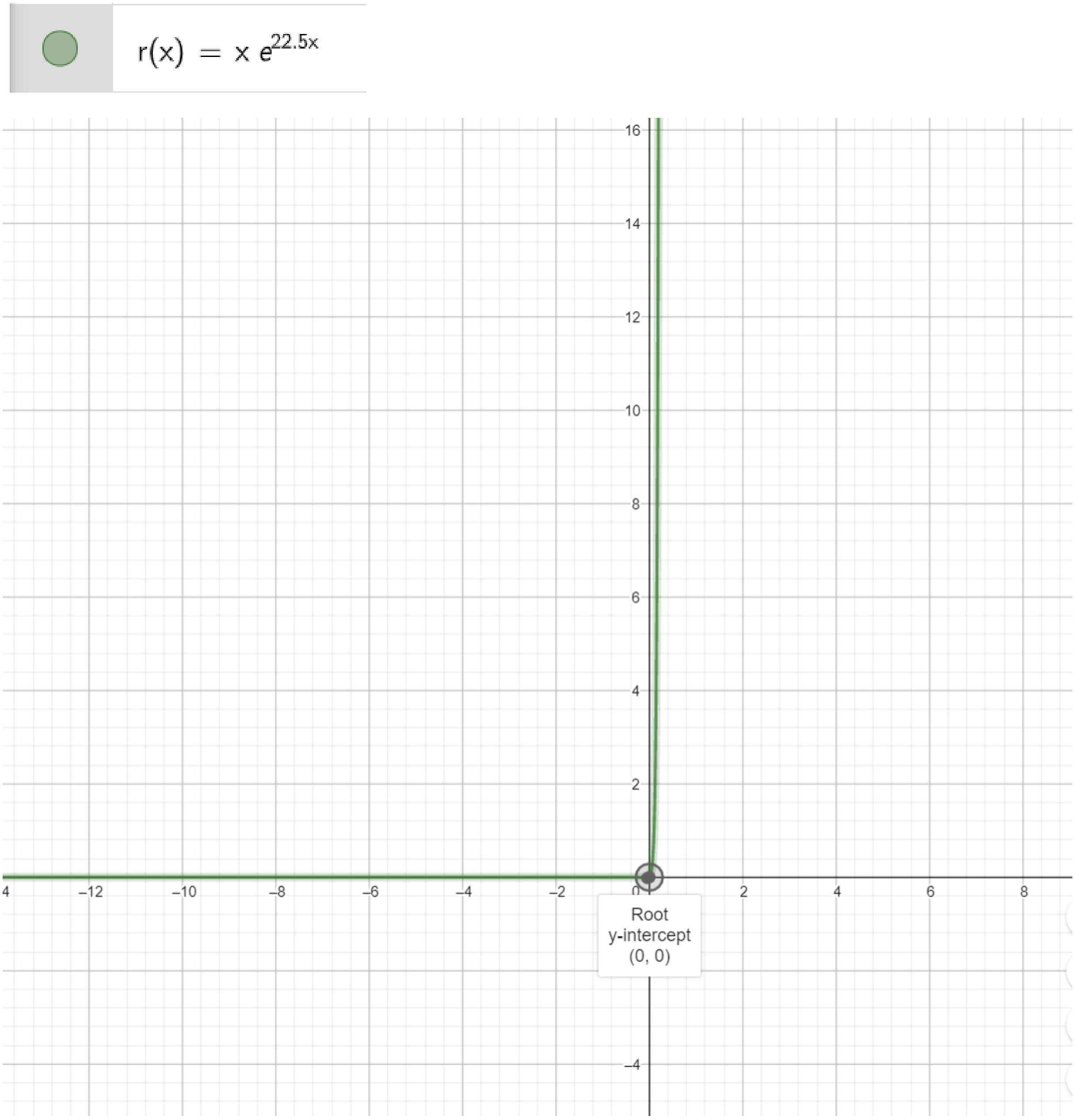
B) Using e and θ = 22.5 to represent our odd new Identity function in a complex plane

1- $e^{\theta x} = e^{22.5\,x}$; intersect Y at point (0,1) and start from X =1.5 Y =0 for any X

And $e^{\theta x} = 2\,e^{22.5\,x}$; intersect Y at point (0,2) and start from X =1.5 Y =0 for any X

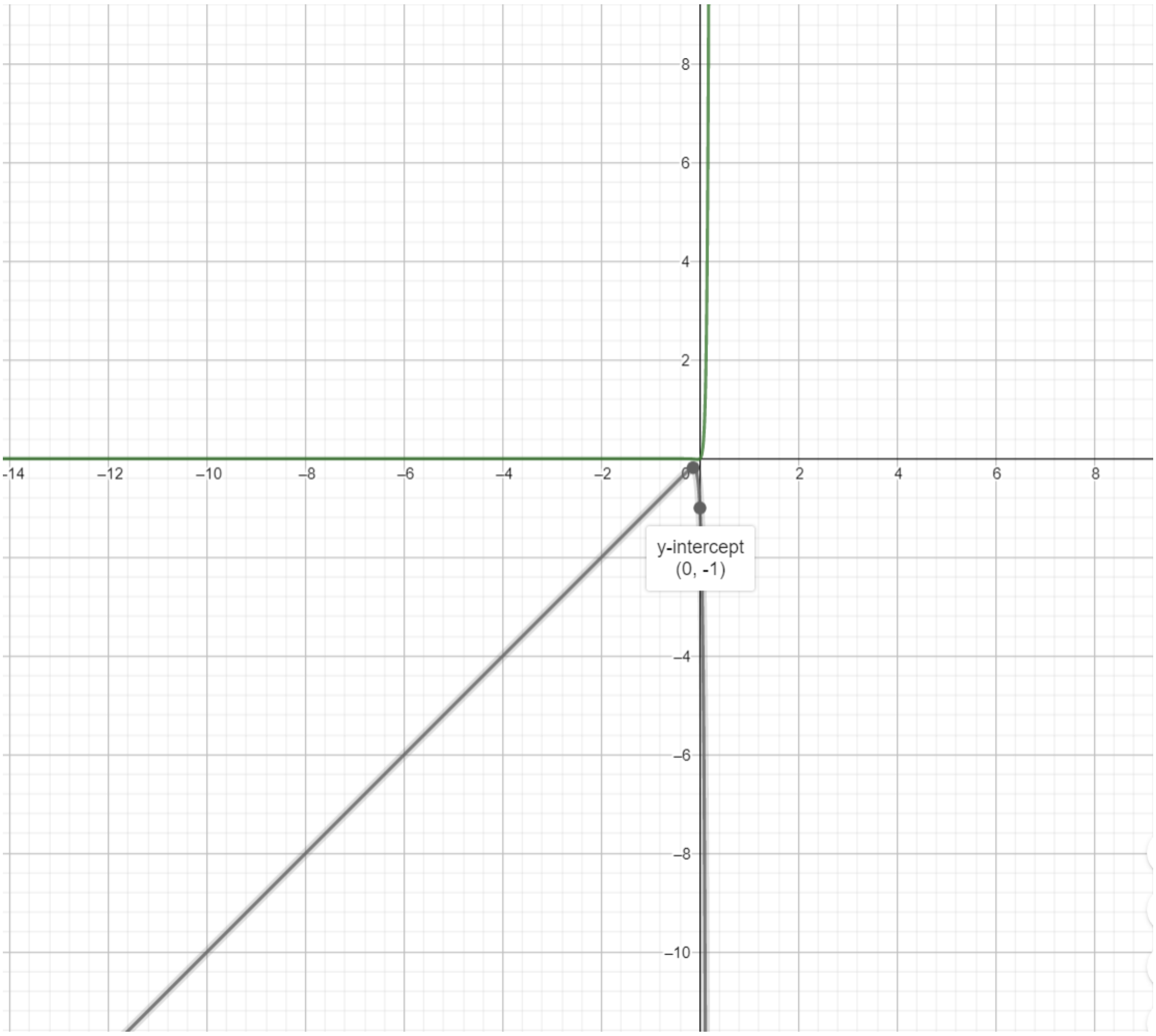
And $e^{\theta x} = 3\,e^{22.5\,x}$; intersect Y at point (0,3) and start from X =1.5 Y =0 for any X

THEN



2- Now we are going to remove this 22.5 degrees from f(x) = X

$$q(x) = x - e^{22.5x}$$



x	q(x)	r(x)
-4.5	-4.5	0
-4	-4	0
-3.5	-3.5	0
-3	-3	0
-2.5	-2.5	0
-2	-2	0
-1.5	-1.5	0
-1	-1.0000000001692	-0.0000000001692
-0.5	-0.5000130072977	-0.0000065036488
0	-1	0
0.5	-76879.41976467772	38439.95988233886
1	-5910522062.023283	5910522063.023283
1.5	-454400461972585...	681600692958881.1
2	-349342710574850...	698685421149700...
2.5	-268574395593695...	671435988984237...

As we see from these two functions

Q(X) = X for all x <= -1.5 and Q(X) = -1 at X = 0

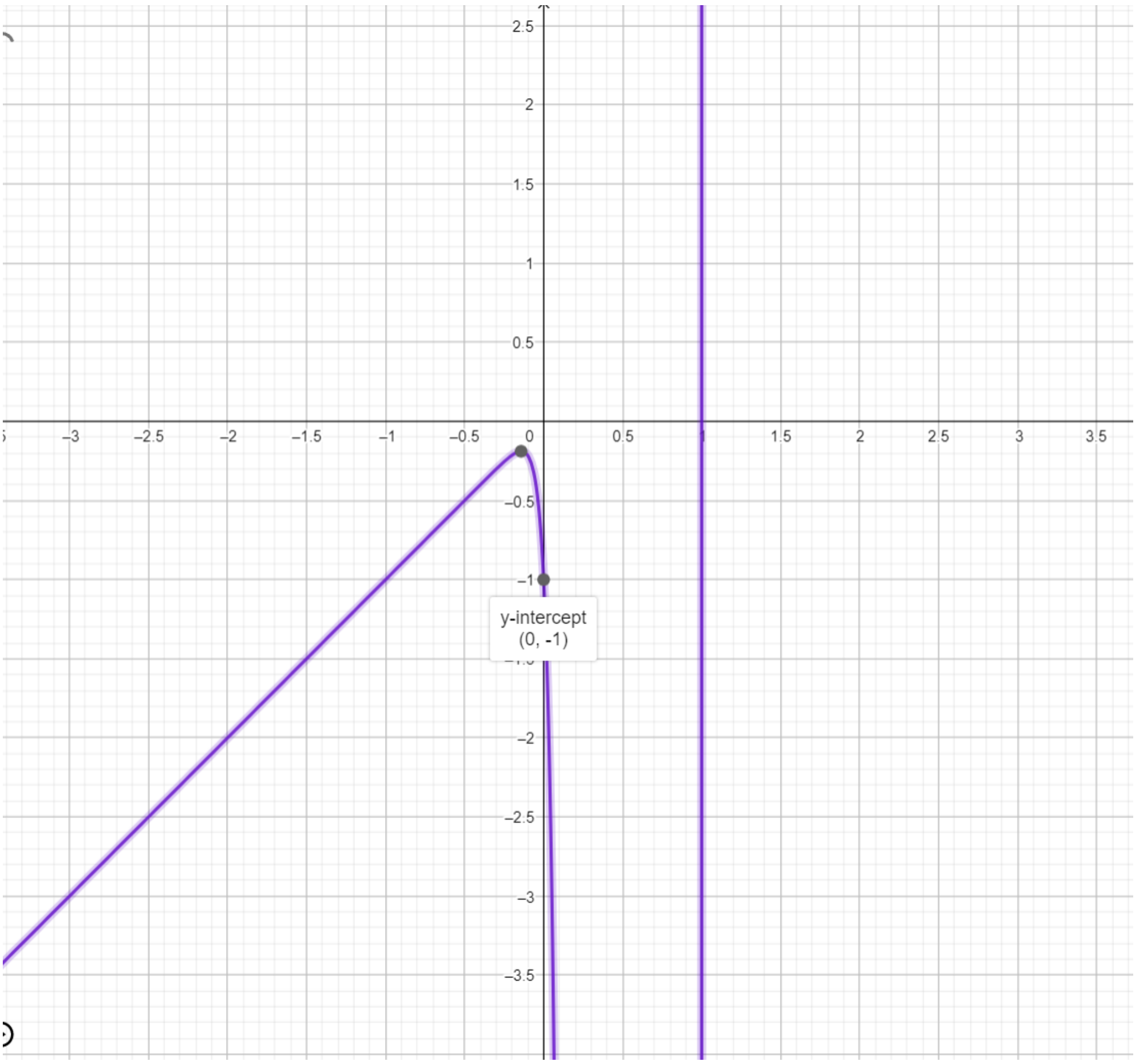
AND R(X) = 0 for all X <= -1.5 and R(X) = 0 at X =0

3- We are going to add both functions together

S(X) = Q(X) + R(X); this will make S(X) = 1 at X =1

$$s(x) = q(x) + r(x)$$

$$\rightarrow x - e^{22.5x} + x\, e^{22.5x}$$



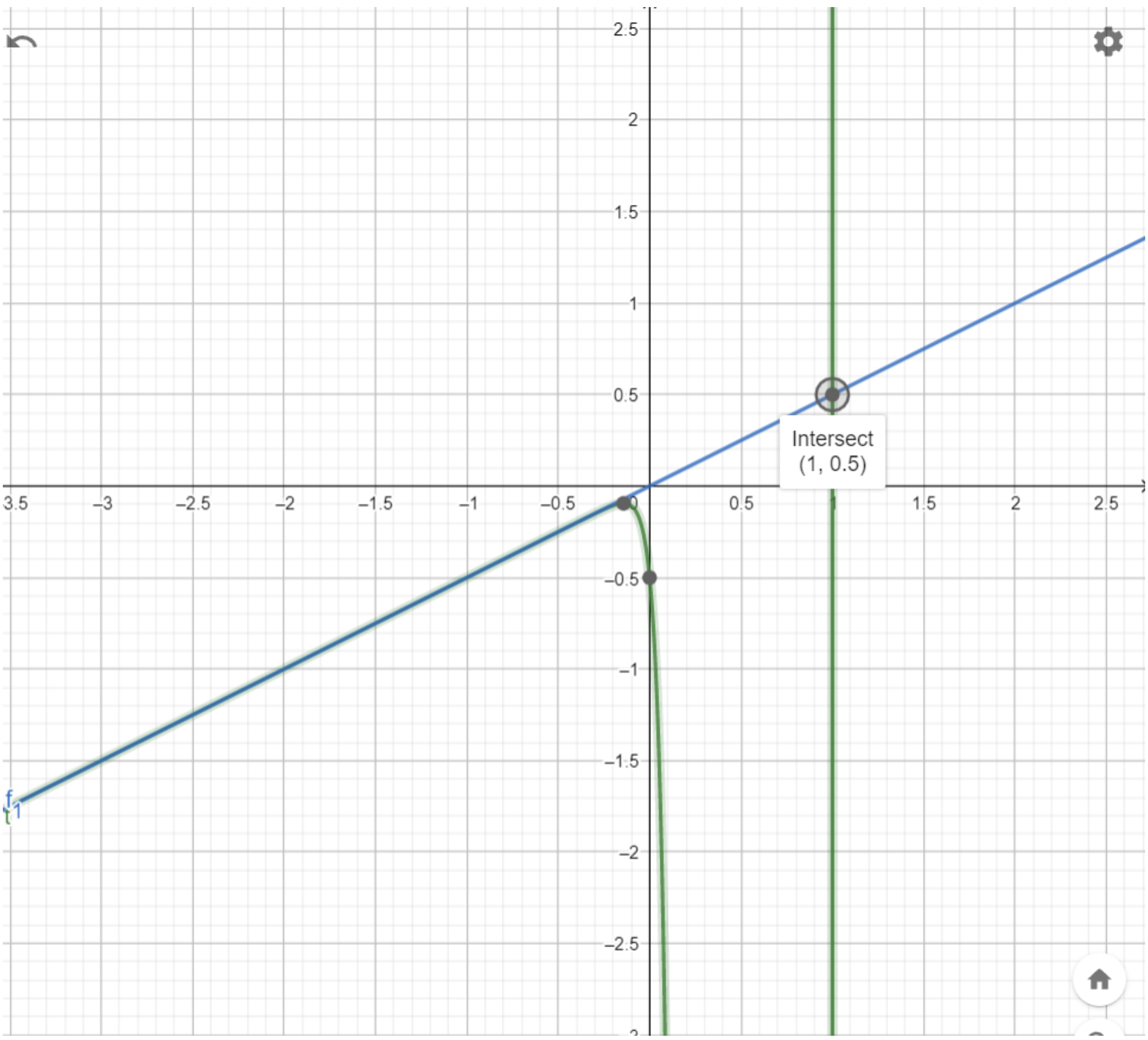
x	q(x)	r(x)	s(x)
-4.5	-4.5	0	-4.5
-4	-4	0	-4
-3.5	-3.5	0	-3.5
-3	-3	0	-3
-2.5	-2.5	0	-2.5
-2	-2	0	-2
-1.5	-1.5	0	-1.5
-1	-1.0000000001692	-0.0000000001692	-1.0000000003384
-0.5	-0.5000130072977	-0.0000065036488	-0.5000195109465
0	-1	0	-1
0.5	-76879.41976467772	38439.95988233886	-38439.45988233886
1	-5910522062.023283	5910522063.023283	1
1.5	-454400461972585...	681600692958881.1	227200230986295.2
2	-349342710574850...	698685421149700...	349342710574850...
2.5	-268574395593695...	671435988984237...	402861593390542...

4- We are going to go back to the 22.5 degress which is f(X) = X/2
By dividing S(X) by two
T(X) = ½ * S(X) = ½ * (R(X) + Q(X))
If X = 0 then T(X) = -0.5 and If X =1 then T(X) = 0.5

$$t(x) = \frac{q(x) + r(x)}{2}$$

$$\rightarrow \frac{x - e^{22.5x} + x\, e^{22.5x}}{2}$$

$$f_1(x) = \frac{x}{2}$$

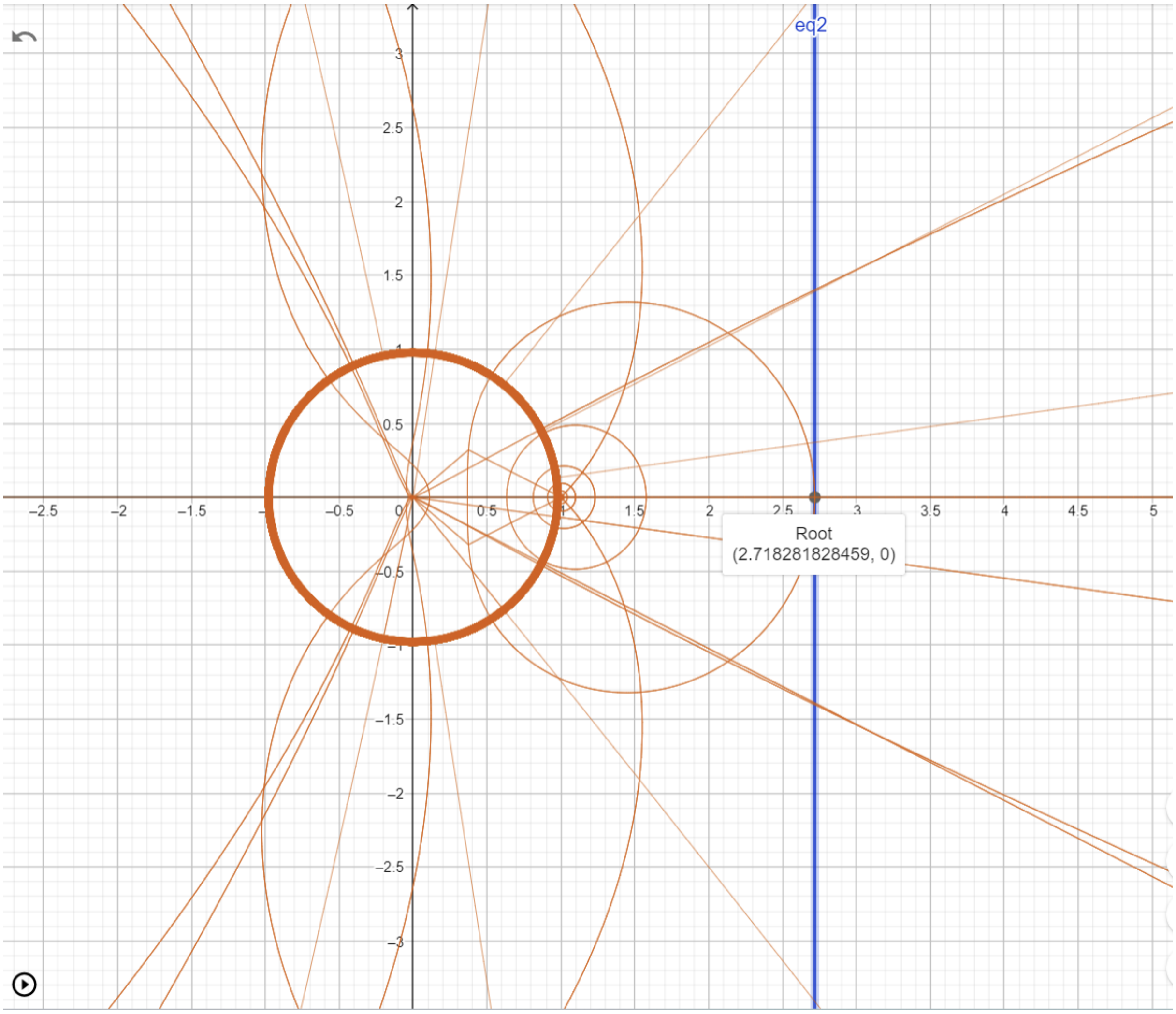


x	q(x)	r(x)	s(x)	t(x)
-5.5	-5.5	0	-5.5	-2.75
-5	-5	0	-5	-2.5
-4.5	-4.5	0	-4.5	-2.25
-4	-4	0	-4	-2
-3.5	-3.5	0	-3.5	-1.75
-3	-3	0	-3	-1.5
-2.5	-2.5	0	-2.5	-1.25
-2	-2	0	-2	-1
-1.5	-1.5	0	-1.5	-0.75
-1	-1.0000000001692	-0.0000000001692	-1.0000000003384	-0.5000000001692
-0.5	-0.5000130072977	-0.0000065036488	-0.5000195109465	-0.2500097554732
0	-1	0	-1	-0.5
0.5	-76879.41976467772	38439.95988233886	-38439.45988233886	-19219.72994116943
1	-5910522062.023283	5910522063.023283	1	0.5
1.5	-454400461972585...	681600692958881.1	227200230986295.2	113600115493147.6

5- Our Odd number identity unit Circle f(Z)

$$v(x) = e^{\left(\left(\frac{1}{\sqrt{2}}+\frac{i}{\sqrt{2}}\right)^{x}\right)}$$

$$eq2 : x = e$$



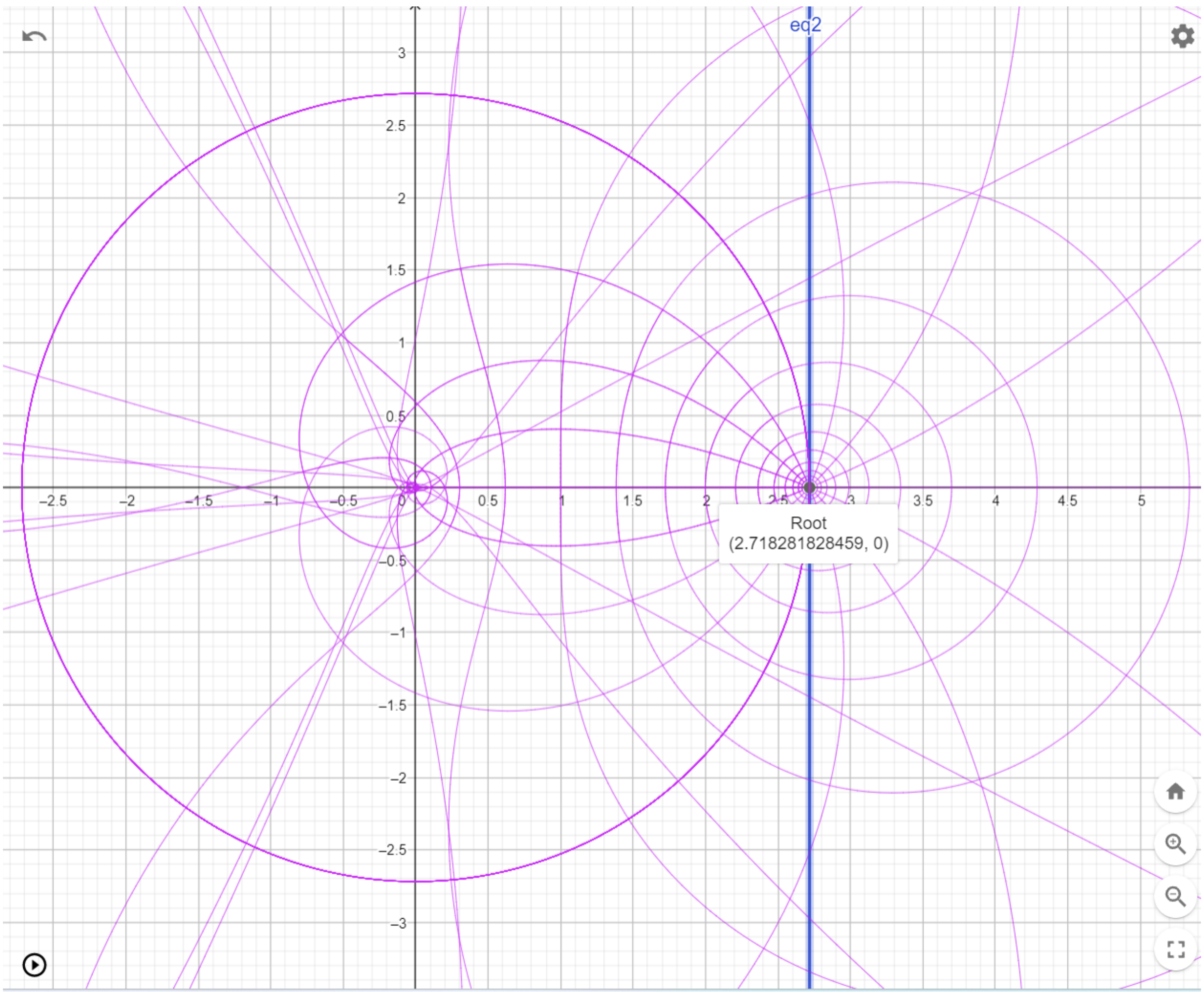
6- We are going to Set X = X/2 -1/2

If X is odd number; then X/2 will be even number + 0.5; and by subtracting this 0.5 we are using even number, i.e., we are setting X = X-1 where X-1 is the number before X where X is an odd number. And to keep X as an odd number we are going to add one again.

So, this will be for odd numbers

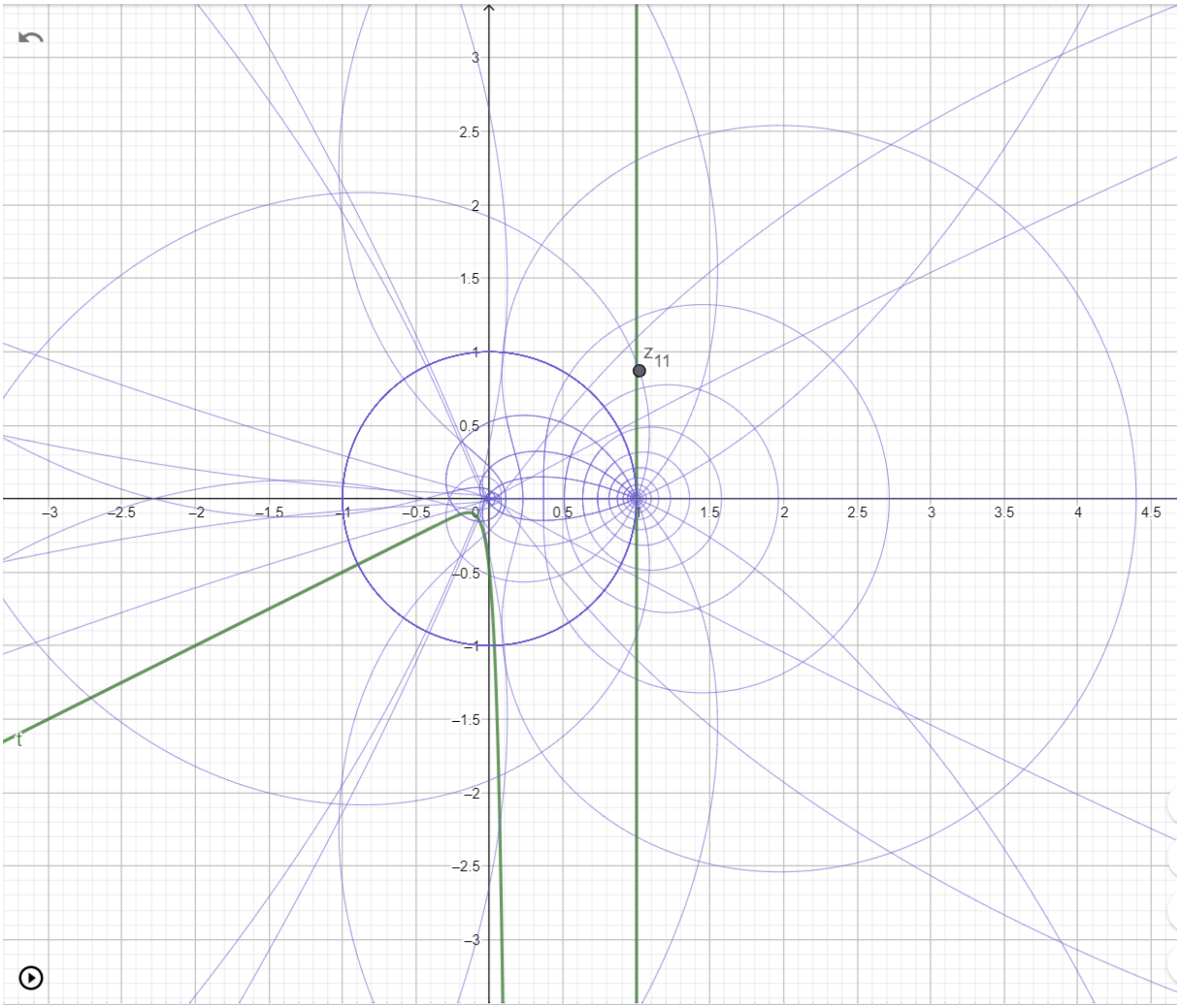
So

$$n(x) = e^{\left(\frac{1}{\sqrt{2}}+\frac{i}{\sqrt{2}}\right)^{\frac{x}{2}-0.5}}+1$$



But for even numbers as if we assumed X was odd at the beginning

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



This means if S is odd, we can get the same angel as even numbers if we used S = S-1= S/2 -1/2 if S is odd number.

Z10; is complex number on complex plane and will move it value on the odd number Identity circle between = { 1, -1, i, -i} as S changed its value between odd numbers.

$$z_{10} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{S-1}$$

$$\longrightarrow -1 + 0\iota$$

1- For Odd numbers in set { 1, 5, 9 , 13 , 17 , 21 , ……} ; the complex number Z10 will changes values between {1,1-} with this order {1,-1,1,-1,1,-1,…..}

2- For Odd numbers in set {3, 7, 11 ,15 ,19,…….}; the complex number Z10 will changes values between {i,-i} with this oder {i,-i,i,-i,i,-i,…..}

3- For Odd numbers in set {-3,-7,-11,-15,-19,…..} ; the complex number Z10 will changes values between {1,1-} with this order {1,-1,1,-1,1,-1,…..}

4- And this is why the cycle of values resets after 8 and not 4 values.

5- to restrict values between only two values {1,-1} we are going to use the negative value for S; so we are goin to use this function instead.

$$z_{14} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{2S-2}$$

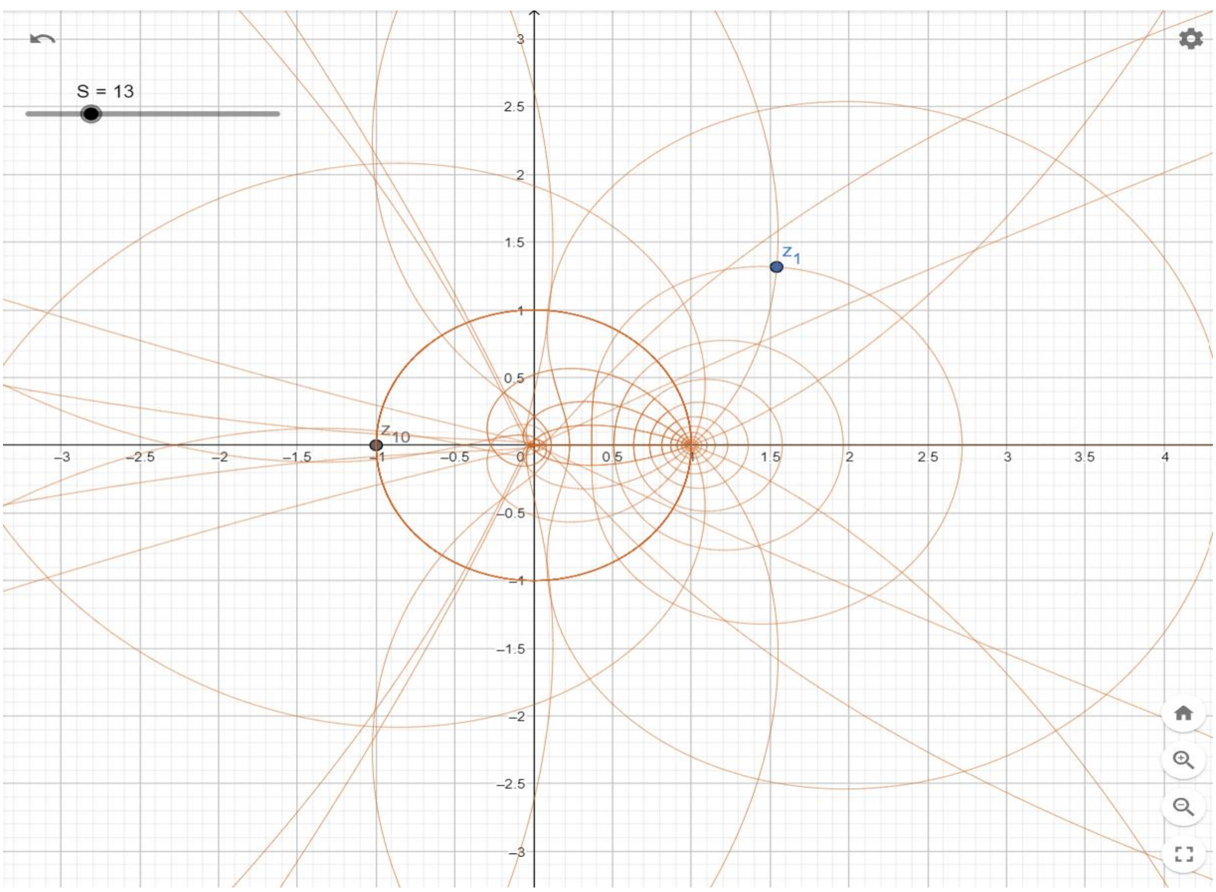
$$\rightarrow 1 - 0i$$

I) for S= S-1 ; half odd numbers will have Z10 = {1, -1} ; and the other half will have Z10={i,-i}

$$k(x) = e^{\left(\left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{\frac{x}{2}-0.5}\right)}$$

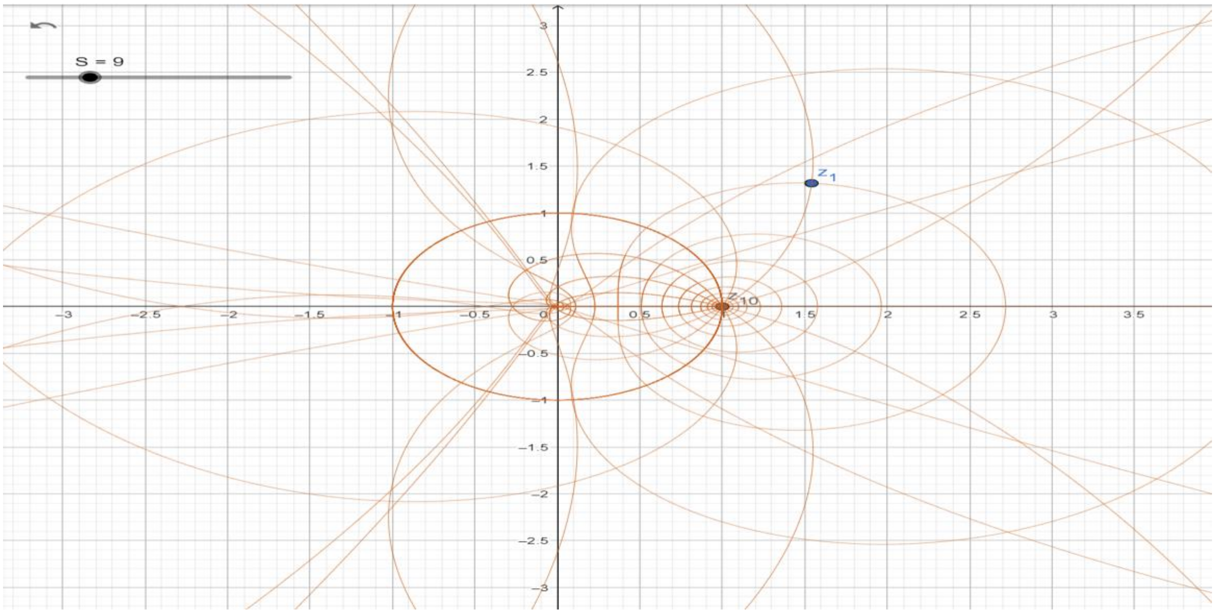
$$z_{10} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{S-1}$$

$$\rightarrow -1 + 0i$$



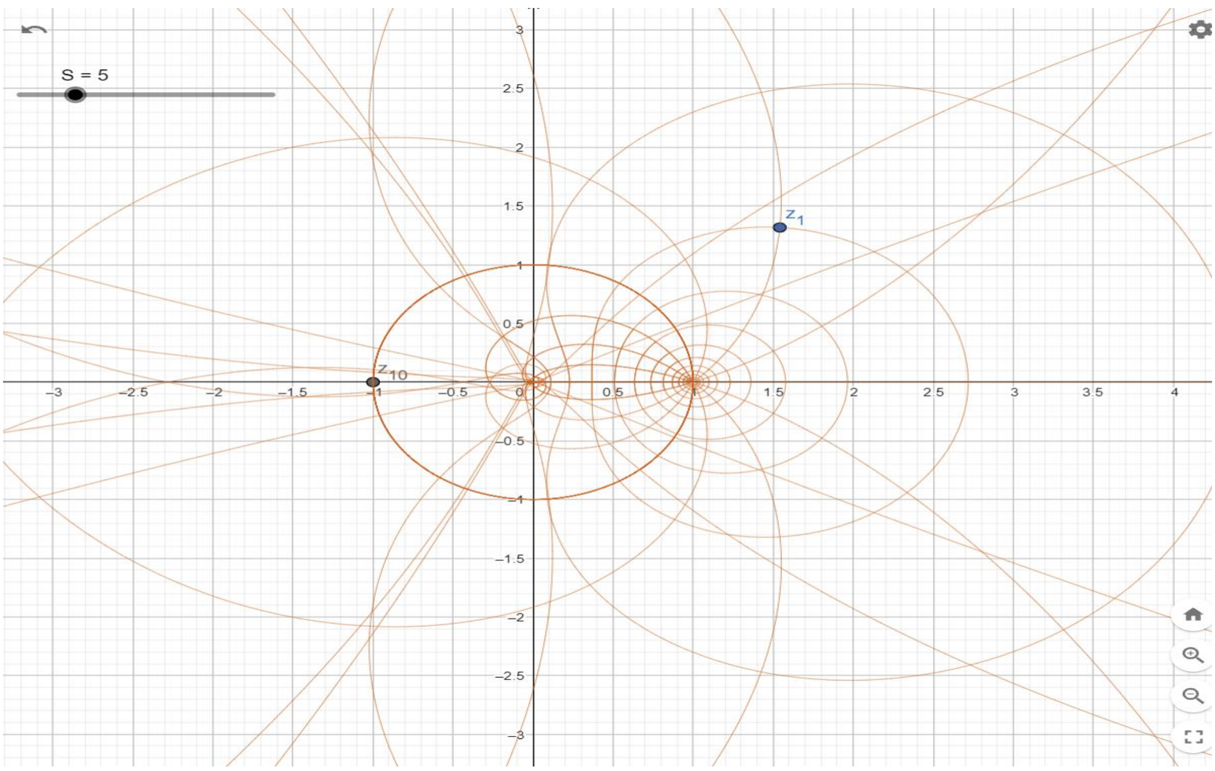
$$z_{10} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{S-1}$$

$\rightarrow$ 1 - 0ί



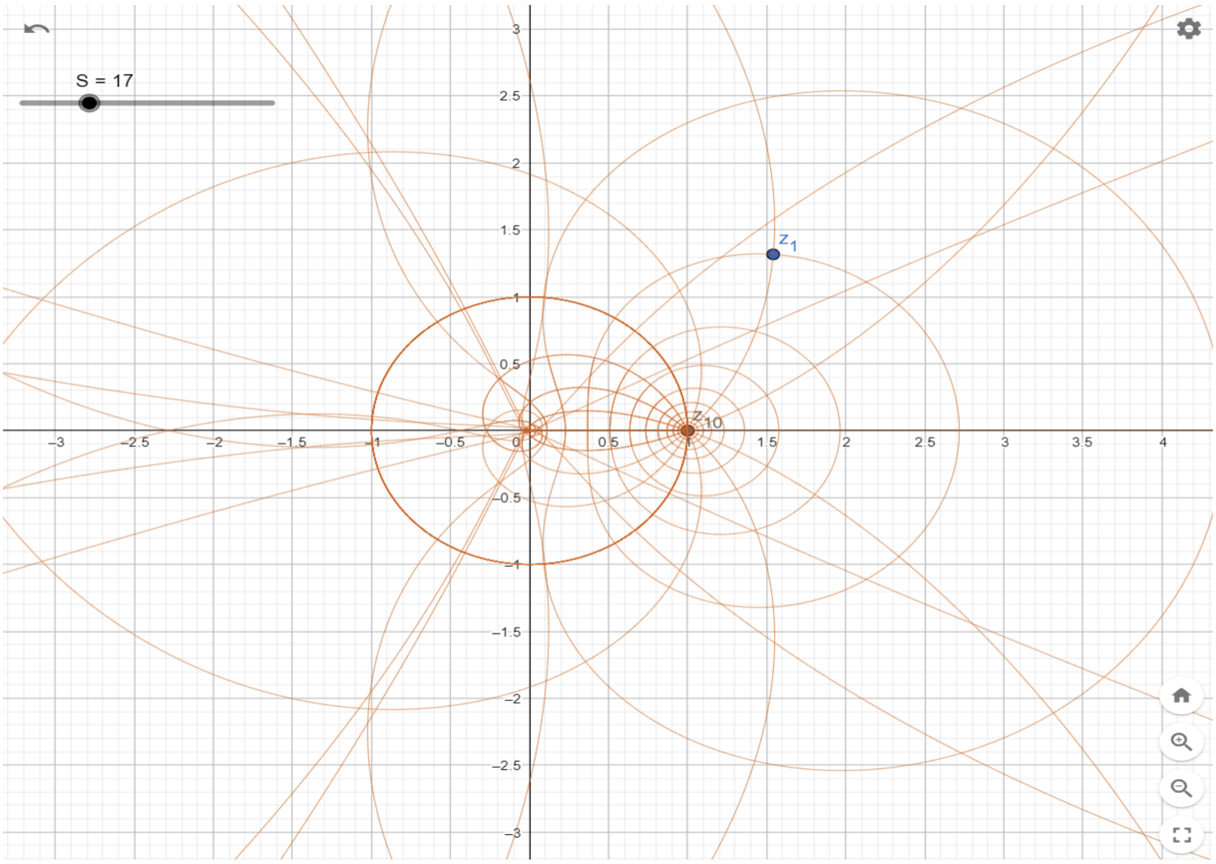
$$z_{10} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{S-1}$$

$\rightarrow$ -1 + 0ί



$$z_{10} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{S-1}$$

$\rightarrow 1 - 0i$



II) for S= 2S-2 ; all odd numbers will have Z10 = {1, -1}

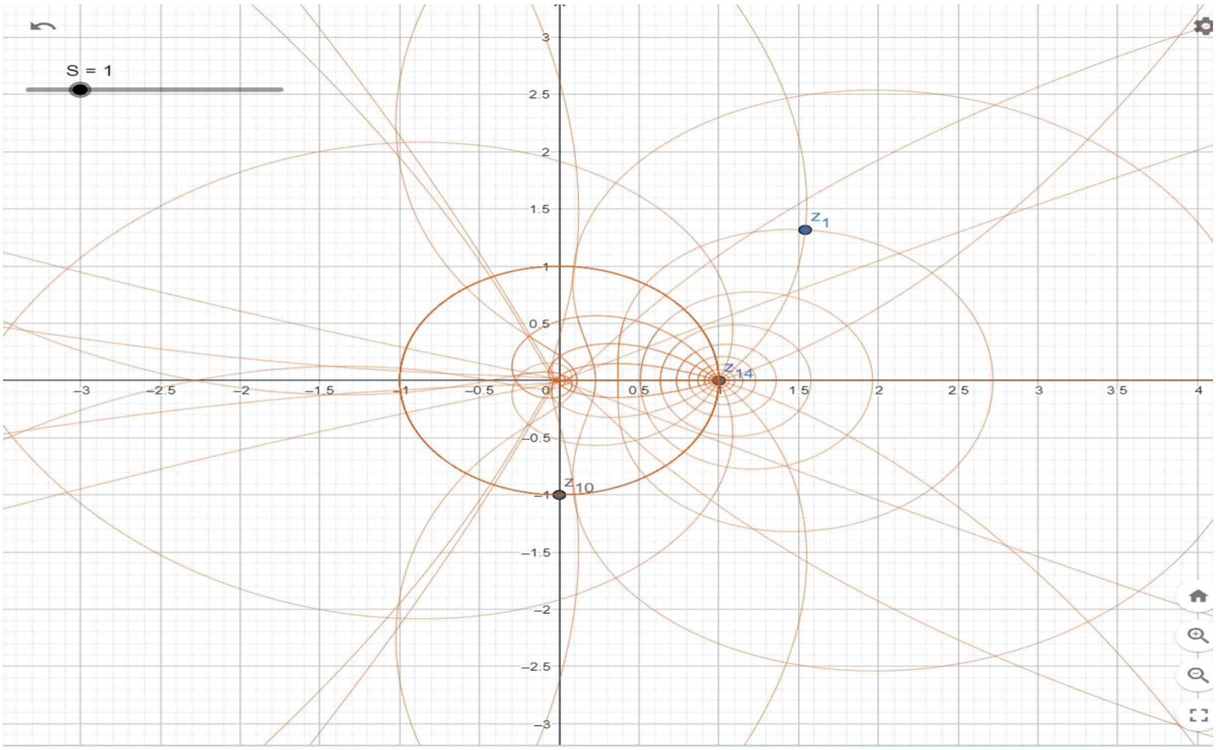
But if we used the new formula for the complex number for odd numbers

$$z_{14} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{2S-2}$$

$\rightarrow 1 - 0i$

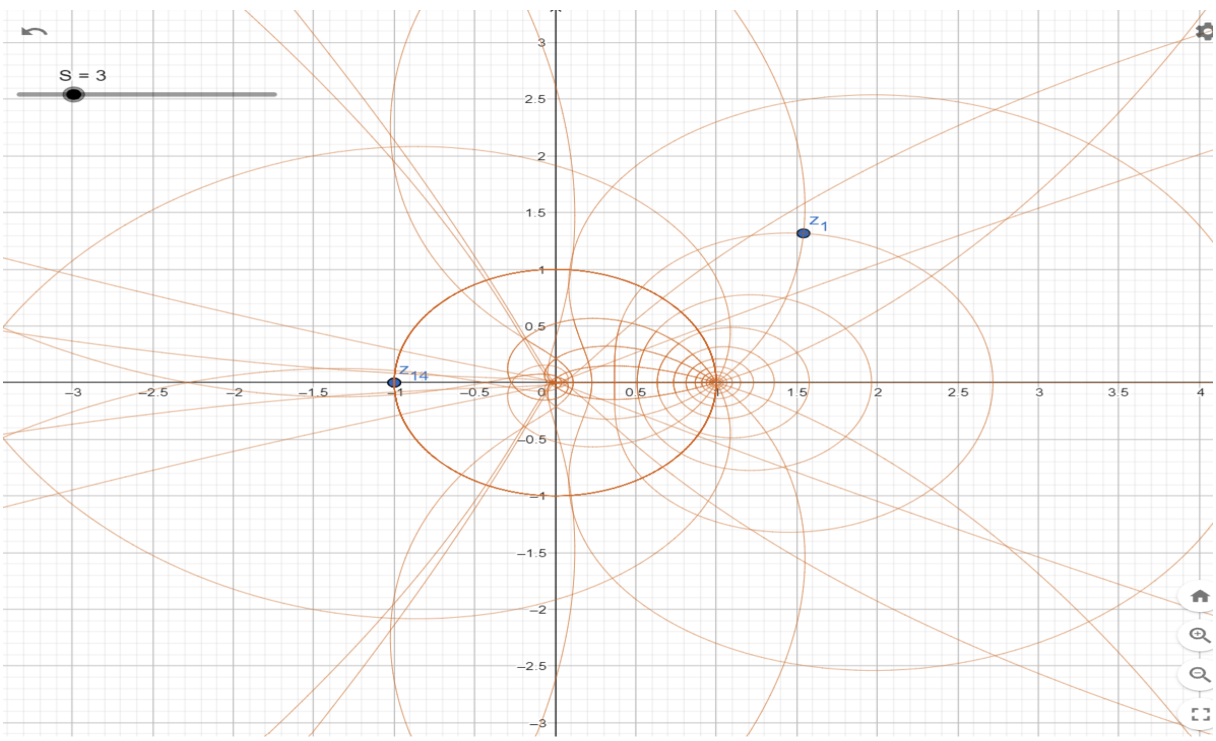
$$z_{14} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{2S-2}$$

$\longrightarrow 1 + 0i$



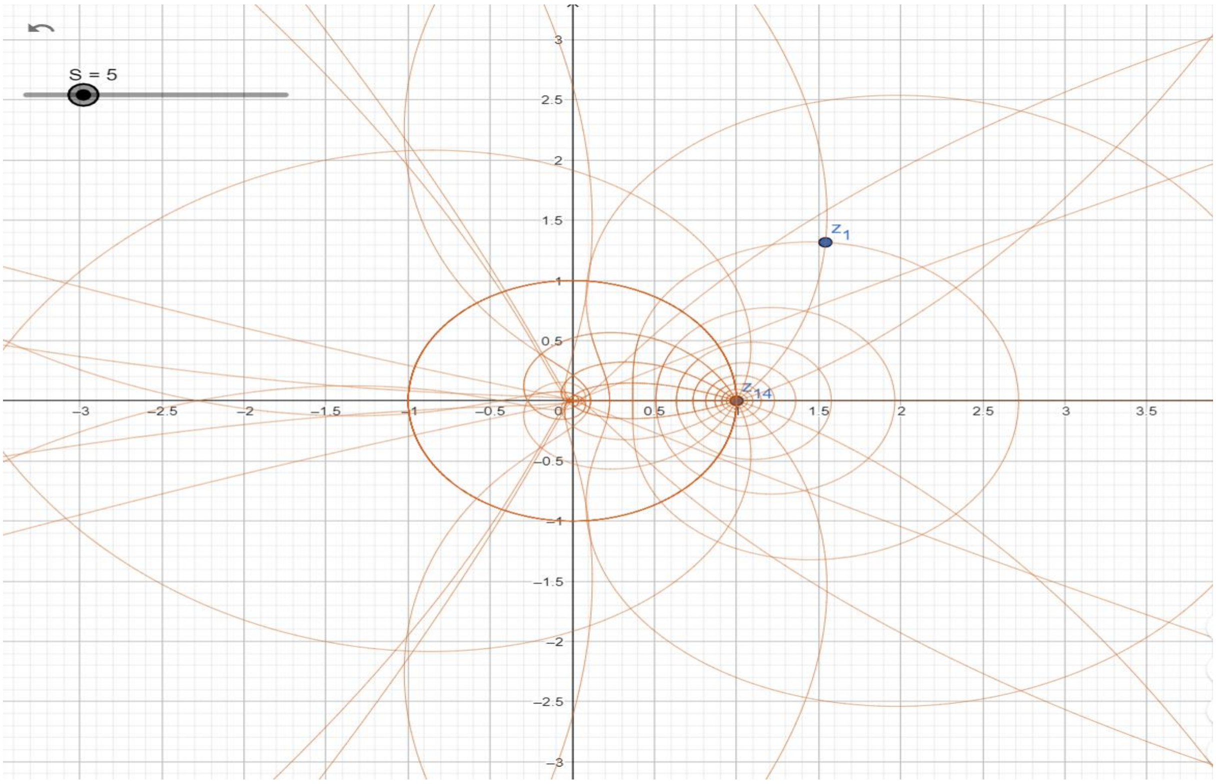
$$z_{14} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{2S-2}$$

$\longrightarrow -1 + 0i$



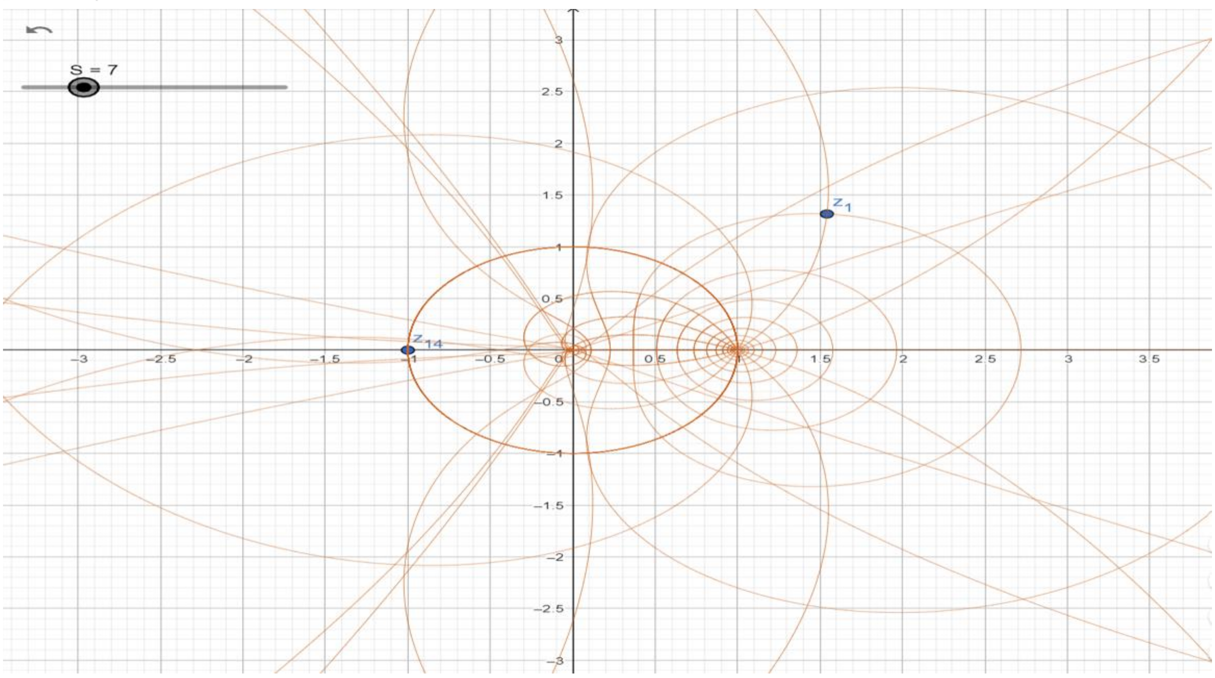
$$z_{14} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{2S-2}$$

$\longrightarrow$ 1 - 0ί



$$z_{14} = \left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^{2S-2}$$

$\longrightarrow$ -1 + 0ί



Conclusion

Using our new Identity unit function in complex plane, helped in explaining the distribution of odd numbers and even numbers in complex plane. Also using exponential function in combine with our Identity function helped in determine that S = 2S + 2 can be used. And how when we used this form of transformation in combine with our new Identity function get us all the odd numbers on values = {1, -1}. Then we can say that

$$f(x) = z^x = \left(\pm\frac{1}{\sqrt{2}} \pm i\ \frac{1}{\sqrt{2}}\right)^x ; where\ x = 2x + 2$$

Then

$$\pm 1 = \left(\pm\frac{1}{\sqrt{2}} \pm i\ \frac{1}{\sqrt{2}}\right)^{2X+2}$$

$$e^{i\left(\pm\frac{1}{\sqrt{2}} \pm i \frac{1}{\sqrt{2}}\right)^{2X+2}} = e^{-2^x\left(\pm\frac{1}{2} \pm i\frac{1}{2}\right)^{2X}}$$

$$e^{i\left(\pm\frac{1}{\sqrt{2}} \pm i \frac{1}{\sqrt{2}}\right)^{2X+2}} = e^{\pm i}$$

$$-i * 2^x \left(\pm\frac{1}{2} \pm i\ \frac{1}{2}\right)^{2X} = \left(\pm\frac{1}{\sqrt{2}} \pm i\ \frac{1}{\sqrt{2}}\right)^{2X-2}$$

References

Steuding, Jörn; Suriajaya, Ade Irma (1 November 2020). "Value-Distribution of the Riemann Zeta-Function Along Its Julia Lines". Computational Methods and Function Theory. 20 (3): 389–401. doi:10.1007/s40315-020-00316-x. ISSN 2195-3724.

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