Relation Between the Golden Ratio Phi and Zeta Function SUM

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Abstract

This paper will explain the relation between the golden ratio Phi and Zeta function SUM.

First, we will introduce why we used Phi and its functional properties then we will go through some of Phi Properties in a complex plane

Finally, we will use this Golden ratio Phi functional formula, to find the sum of the Prime numbers in Zeta function infinite series in relation with the Golden ration Phi , and pi.

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

1. Introduction

Some of the floating-point operations are not reversable and value depends on computer or calculator accuracy. This is a floating-point Operations approximation Issue with calculators and computers.

Try these three operations

$$\mathrm{l} = \sqrt{2} - \frac{2}{\sqrt{2}}$$

$$\longrightarrow 0$$

$$\mathrm{m} = \sqrt{2} - \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}$$

$$\longrightarrow \frac{0}{1}$$

$$\mathrm{n} = \left(\sqrt{2}\right)^2$$

$$\longrightarrow 2$$

but

$$IFF\ \left(\sqrt{2}\right)^2 = 2\ THEN\ \left(\sqrt{2} * \sqrt{2}\right) = 2$$

$THEN$

$$\sqrt{2} - \frac{2}{\sqrt{2}}\ it\ should\ be\ \sqrt{2} - \frac{2}{\sqrt{2}} = \sqrt{2} - \frac{\sqrt{2} * \sqrt{2}}{\sqrt{2}} = \sqrt{2} - \sqrt{2} = 0$$

Why $in\ calculators\ \sqrt{2} - \frac{2}{\sqrt{2}} = -2.369564934338495538364073564834 9e - 47$

$$value\ depneds\ on\ calculator\ accuracy\ although\ same\ Calculator\ shows\ \left(\sqrt{2}\right)^2 = 2$$

so, we are going to use this number as if it was unit (variable) for our operations so we will be able to reverse it. The only constant we know that will have $\sqrt{2}$ is $\sqrt{\varphi} = \sqrt{\frac{\sqrt{5}+1}{2}}$

so, I am going to use $\sqrt{\varphi}\ and\ \varphi$ as known fixed point for all calculations to understand other functions behaviours in term at function value Phi then interpret this behaviour to the rest of the functional forms.

A) Facts and properties of $\varphi = \frac{\sqrt{5}+1}{2}$

a. Multiplication of two consecutive numbers equal one; Because $\varphi\,(\,\varphi - 1) = 1$

i. $at\ X = \varphi\,; \quad X\,(\,X - 1) = 1$

b. Reciprocal of number equal Previous number; because $(\,\varphi - 1) = \frac{1}{\varphi}$

i. $at\ \ X = \ \varphi\,;\ \ (X - 1) = \frac{1}{X}$

c. Difference between number and its reciprocal equal 1; because $\left(\,\varphi - \frac{1}{\varphi}\right) = 1$

i. $at\ \ X = \ \varphi\,;\ \left(X - \frac{1}{X}\right) = 1$

B) Study φ Reciprocal of number Properties

$$(\,\varphi - 1) = \frac{1}{\varphi}$$

$divid\ both\ sides\ by\ \sqrt{\varphi};\ Then\ \left(\sqrt{\varphi} - \frac{1}{\sqrt{\varphi}}\right) = \frac{1}{\varphi\sqrt{\varphi}}$

THEN at $X = \varphi$

$$\left(\sqrt{X} - \frac{1}{\sqrt{X}}\right) = \frac{1}{X\sqrt{X}}$$

This function has some interesting, sweet points for intersection with Y

$$f(X) = \ \sqrt{X} - \frac{1}{\sqrt{X}}$$

1- *At* $X = 1$ *THEN* $f(x) = 0$
2- *At* $X = 2$ *THEN* $f(X) = \frac{1}{\sqrt{2}}$
3- *At* $X = 4$ *THEN* $f(X) = \frac{3}{2} = 1.5$
4- *At* $X = 16$ *THEN* $f(X) = \frac{15}{2} = 3.75$
5- *At* $X = 25$ *THEN* $f(X) = 4.8$
6- *At* $X = 64$ *THEN* $f(X) = \frac{63}{8} = 7.875$
7- *At* $X = 64$ *THEN* $f(X) = 9.9$
8- *At* $X = \varphi$ *THEN* $f(X) = \sqrt{\varphi} - \frac{1}{\sqrt{\varphi}} = \frac{1}{\varphi\sqrt{\varphi}}$

So this φ *is actually the determinate for the conversion between base 10 system and power 2 system*

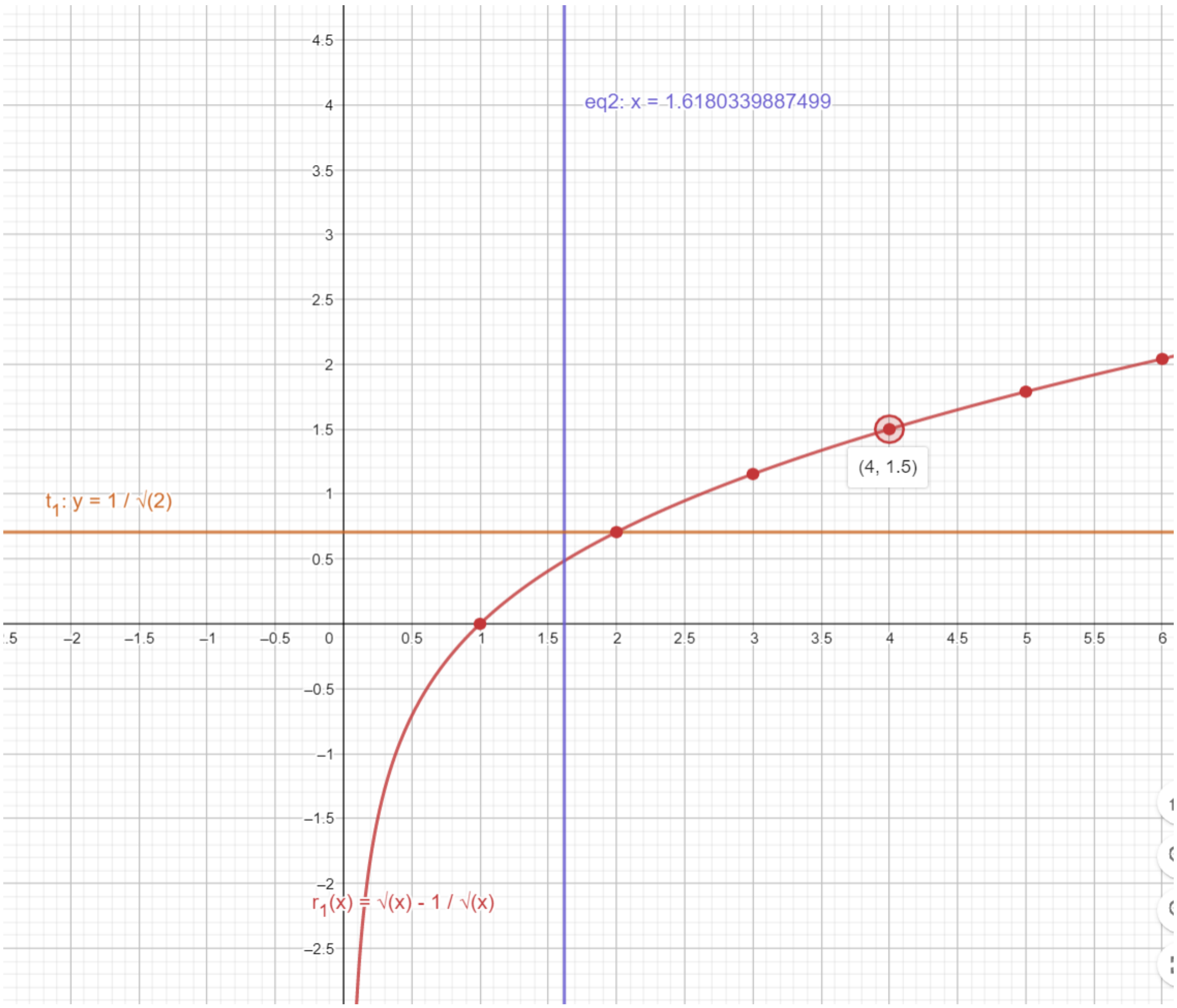
$$\left(\sqrt{X} - \frac{1}{\sqrt{X}}\right) = \frac{1}{X\sqrt{X}}\ ;at\ X = \ \ \varphi$$

$$r_1(x) = \sqrt{x} - \frac{1}{\sqrt{x}}$$

$$t_1 : y = \frac{1}{\sqrt{2}}$$

$$a = \frac{\sqrt{5} + 1}{2}$$

$\rightarrow$ 1.6180339887499



$C)\ \ At\, X = \varphi = \frac{\sqrt{5}+1}{2}$

$$\left(\sqrt{X} - \frac{1}{\sqrt{X}}\right) = \frac{1}{X\sqrt{X}} \quad ; at\ X = \varphi = \frac{\sqrt{5}+1}{2}$$

$$\left(\sqrt{\varphi} + \frac{1}{\sqrt{\varphi}}\right) = \varphi\sqrt{\varphi}$$

$$\varphi^{\frac{-1}{2}} + \varphi^{\frac{1}{2}} = \varphi^{\frac{3}{2}}$$

$$\frac{1}{\sqrt{x}} + \sqrt{x} = x\sqrt{x}$$

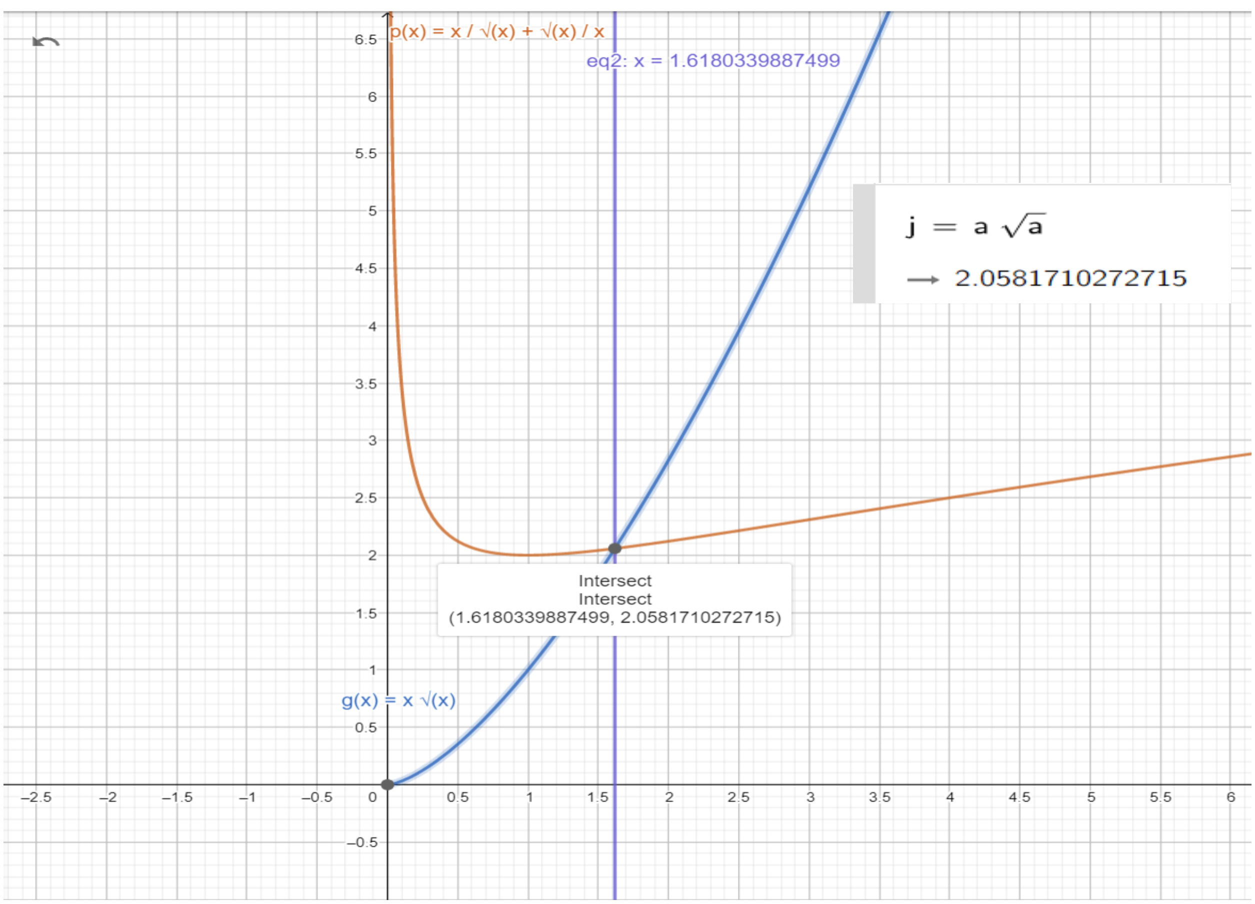
$$\frac{1+x}{\sqrt{x}} = x\sqrt{x}$$

$$1 + x = x^2$$

$$x - x^2 = -1$$

$$\frac{1+x}{x} = x$$

$$x = \sqrt{x+1}$$



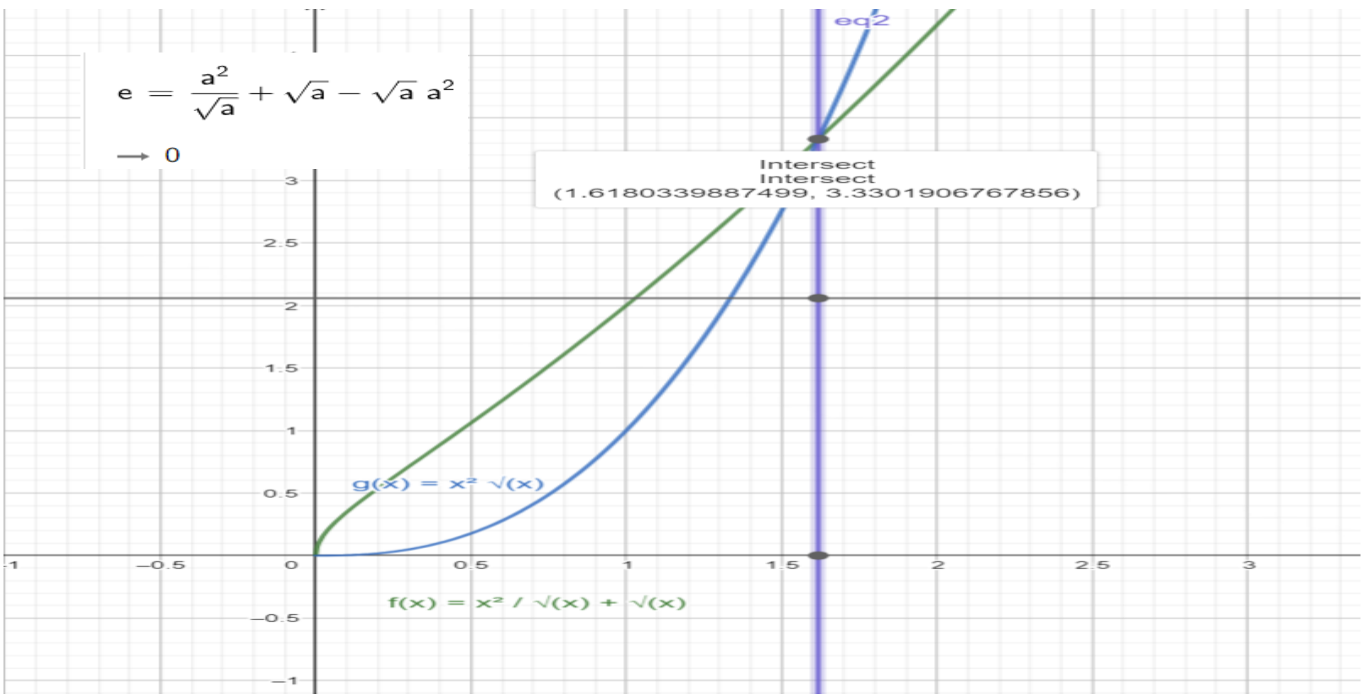
Time x the same ϕ

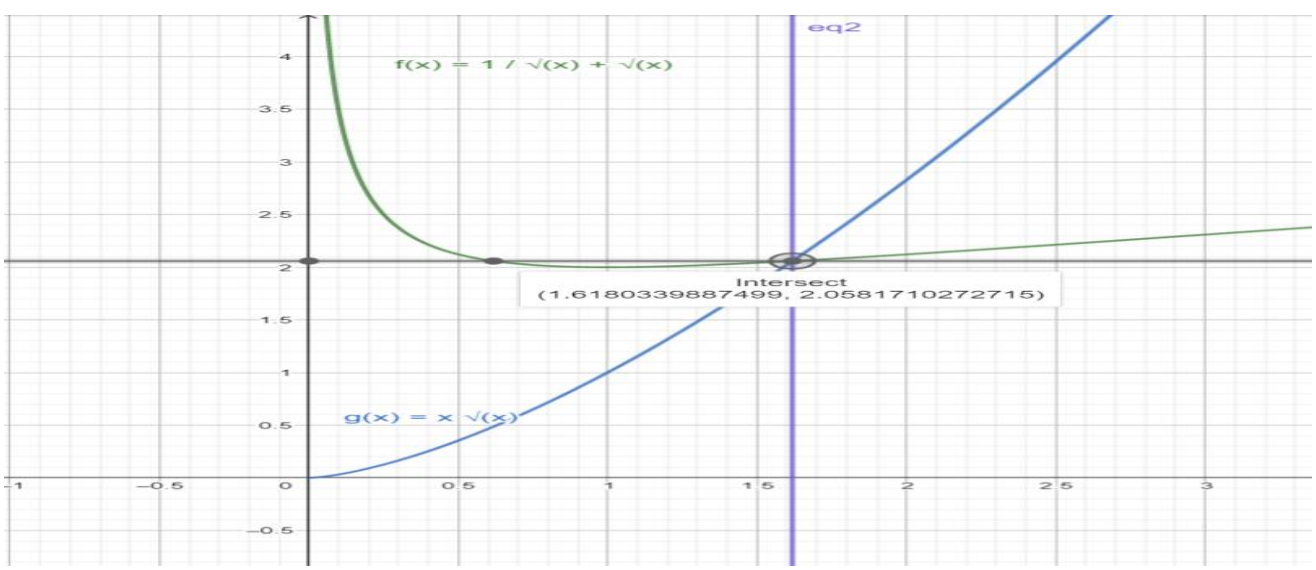
$$\varphi^{\frac{3}{2}} + \varphi^{\frac{1}{2}} = \varphi^{\frac{5}{2}}$$

$$\frac{x^2}{\sqrt{x}} + \sqrt{x} = x^2\sqrt{x}$$

$$x\left(\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x}\right) = x * x\,\sqrt{x} = x\,\left(\frac{1}{\sqrt{x}} + \sqrt{x}\right)$$

$$\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x} = x\,\sqrt{x}$$





also, can be written as

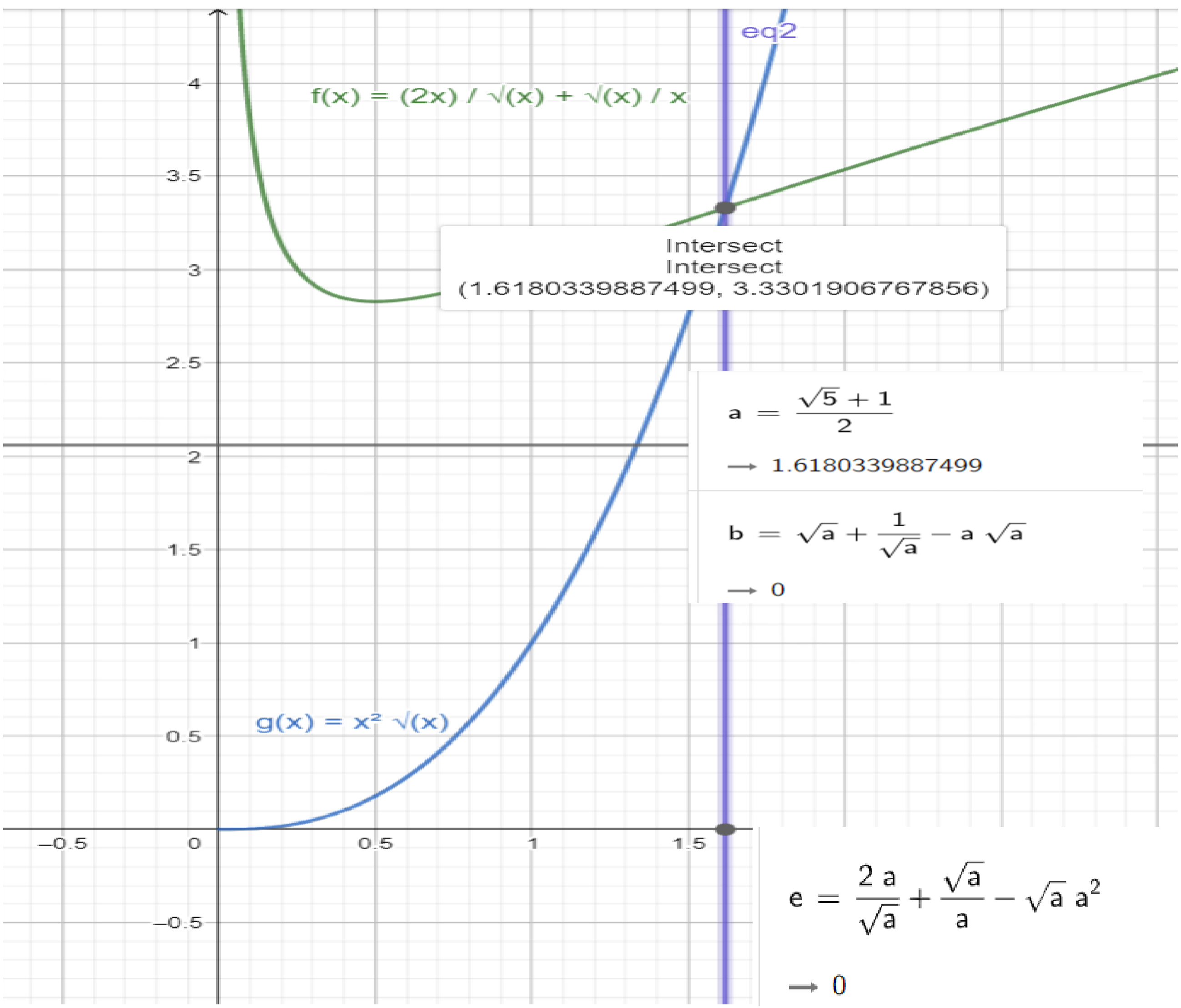
$$\varphi^{\frac{1}{2}} + \varphi^{\frac{-1}{2}} = \varphi^{\frac{5}{2}} - \varphi^{\frac{1}{2}}$$

$$2 * \varphi^{\frac{1}{2}} + \varphi^{\frac{-1}{2}} = \varphi^{\frac{5}{2}}$$

$$\frac{2x}{\sqrt{x}} + \frac{\sqrt{x}}{x} = x^2\sqrt{x}$$

$$\frac{2x}{\sqrt{x}} + \frac{\sqrt{x}}{x} = x\left(\frac{1}{\sqrt{x}} + \sqrt{x}\right) = \frac{x}{\sqrt{x}} + x\sqrt{x}$$

$$\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x} = x\sqrt{x}$$



Times x the same ϕ

$$\varphi^{\frac{5}{2}} + \varphi^{\frac{3}{2}} = \varphi^{\frac{7}{2}}$$

$$\frac{x^3}{\sqrt{x}} + x\sqrt{x} = x^3\sqrt{x}$$

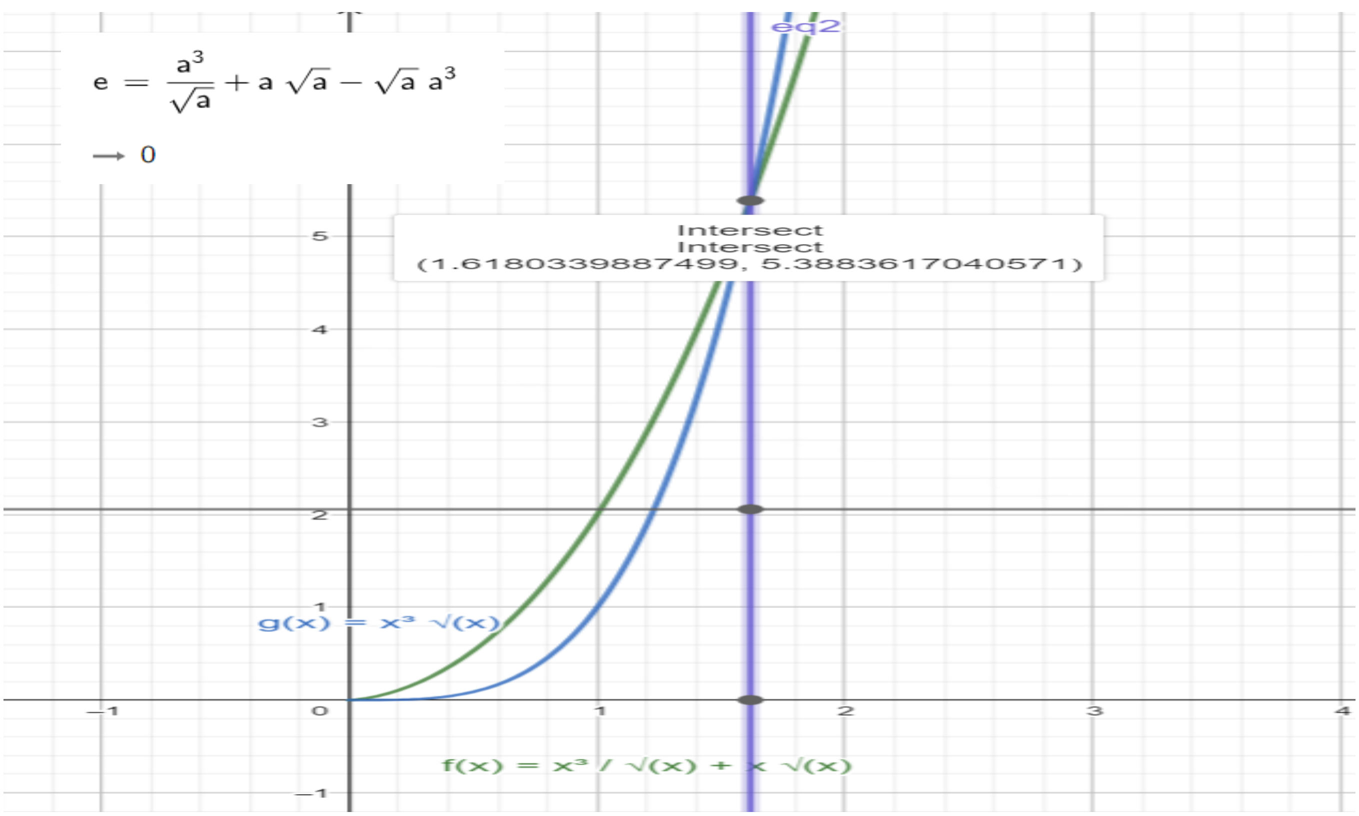
$$x^3\sqrt{x} = x\,x^2\sqrt{x} = x\left(\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x}\right)$$

$$\frac{x^3}{\sqrt{x}} + x\sqrt{x} = x\left(\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x}\right)$$

$$\frac{x^2}{\sqrt{x}} + \sqrt{x} = \left(\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x}\right)$$

$$\frac{x^2}{\sqrt{x}} + \sqrt{x} = x^2\sqrt{x}$$

$$\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x} = x\sqrt{x}$$



Times x the same ϕ

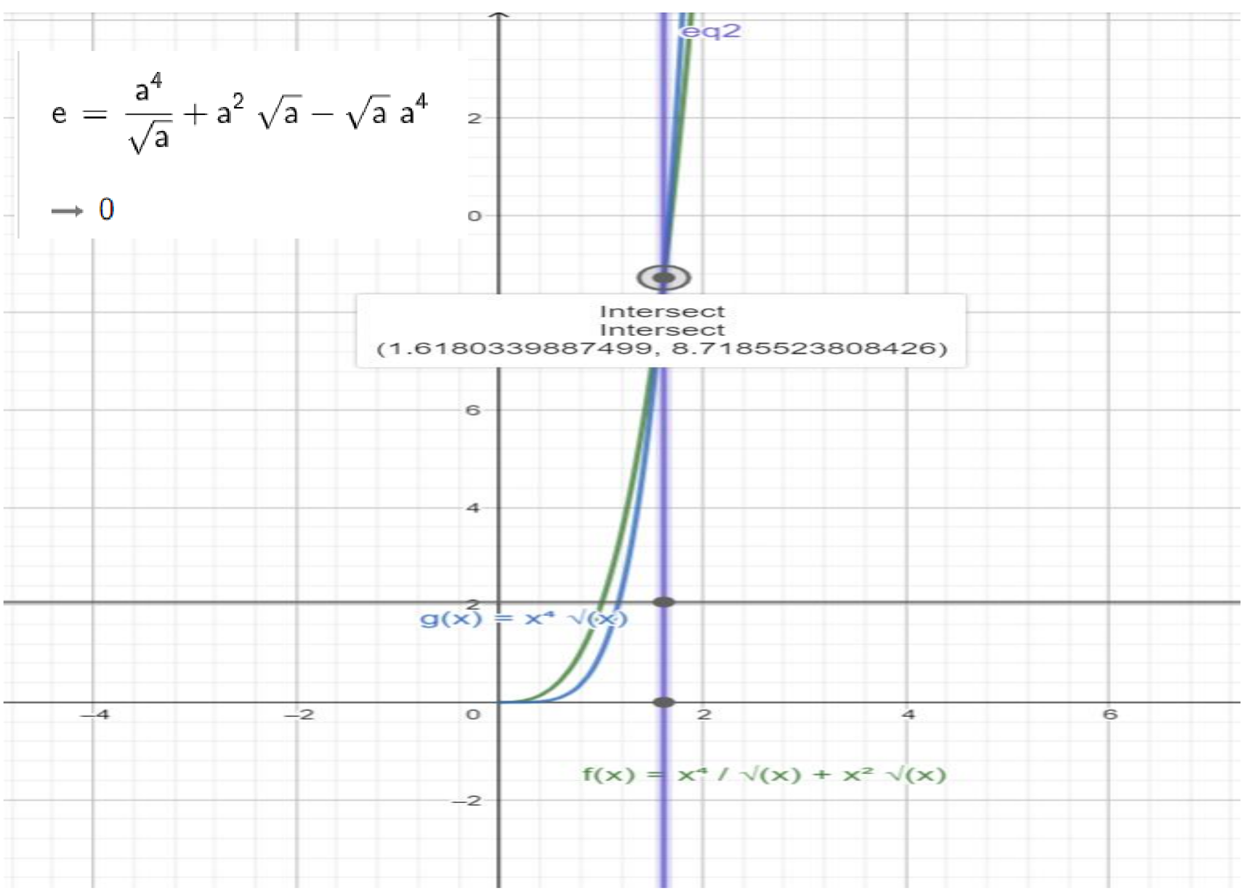
$$\varphi^{\frac{7}{2}} + \varphi^{\frac{5}{2}} = \varphi^{\frac{9}{2}}$$

$$\frac{x^4}{\sqrt{x}} + x^2\sqrt{x} = x^4\sqrt{x}$$

$$x^3\sqrt{x} = x\,x^2\sqrt{x} = x\left(\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x}\right)$$

$$\frac{x^3}{\sqrt{x}} + x\sqrt{x} = x\left(\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x}\right)$$

$$\frac{x^2}{\sqrt{x}} + \sqrt{x} = \left(\frac{x}{\sqrt{x}} + \frac{\sqrt{x}}{x}\right)$$



Any multiply by x will get us back to the same base equation

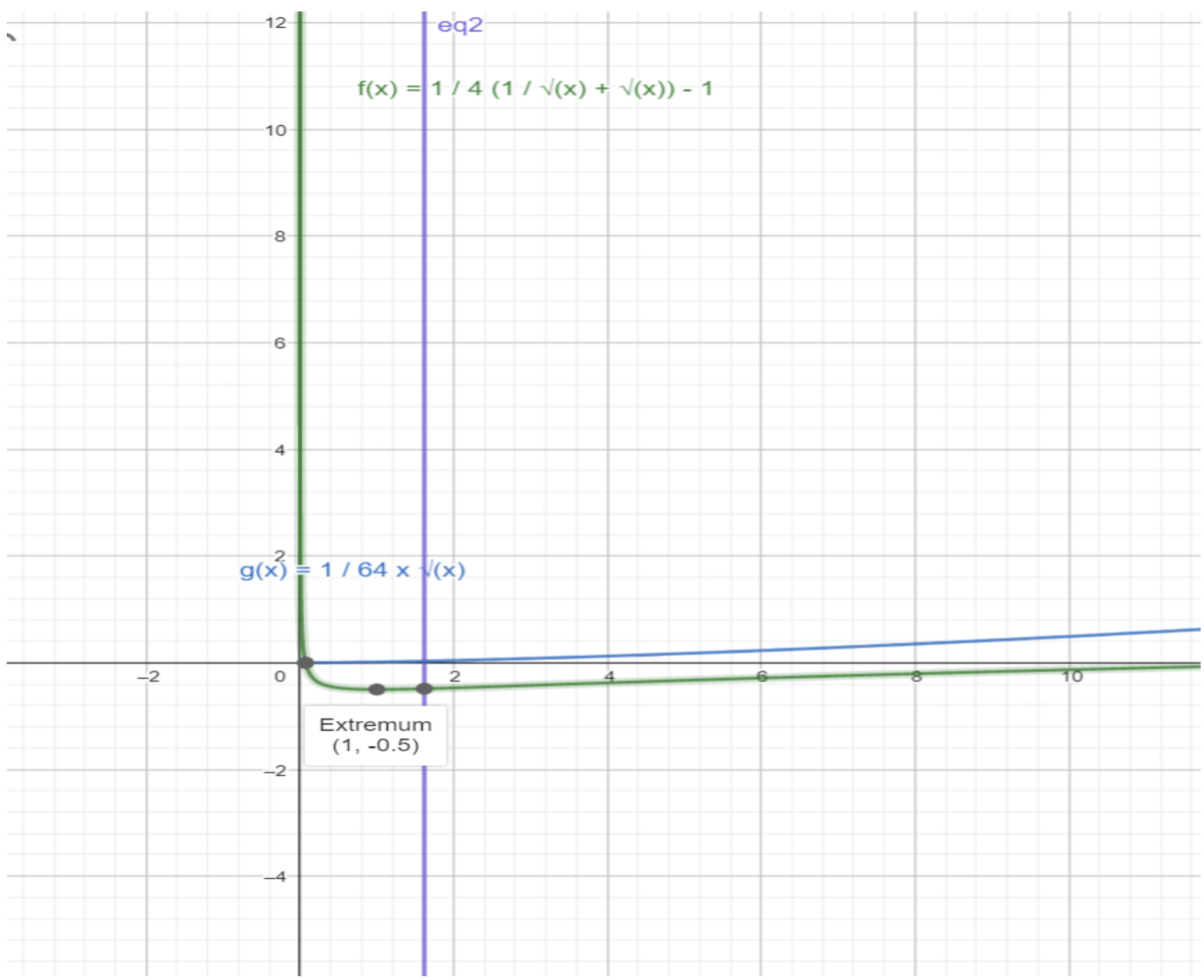
$$\left(\sqrt{\varphi} + \frac{1}{\sqrt{\varphi}}\right) = \varphi\sqrt{\varphi}$$

$$\varphi^{\frac{-1}{2}} + \varphi^{\frac{1}{2}} = \varphi^{\frac{3}{2}}$$

$$\varphi^{\frac{1}{2}} + \varphi^{\frac{3}{2}} = \varphi^{\frac{5}{2}}$$

$$\varphi^{\frac{3}{2}} + \varphi^{\frac{5}{2}} = \varphi^{\frac{7}{2}}$$

$$\varphi^{\frac{5}{2}} + \varphi^{\frac{7}{2}} = \varphi^{\frac{9}{2}}$$



D) Power Two System base ten systems intersection point

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

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

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

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

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

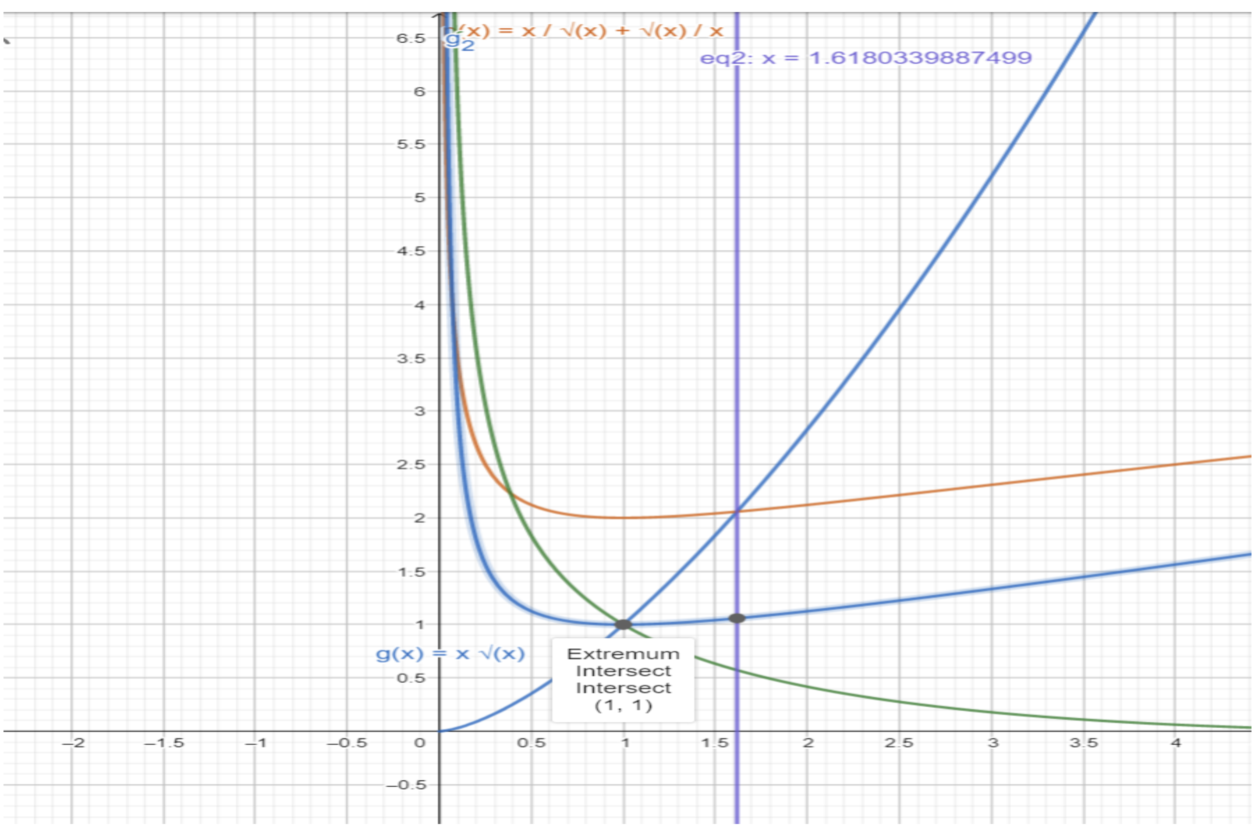
$$\left(\frac{1}{\sqrt{x}}-\sqrt{x}\right) = 0$$

$$\frac{1}{4}\left(\frac{1}{x}+x+2\right) = 1$$

$$\left(\frac{1}{x}+x-2\right) = 0$$

$$(x^2-2x+1) = 0$$

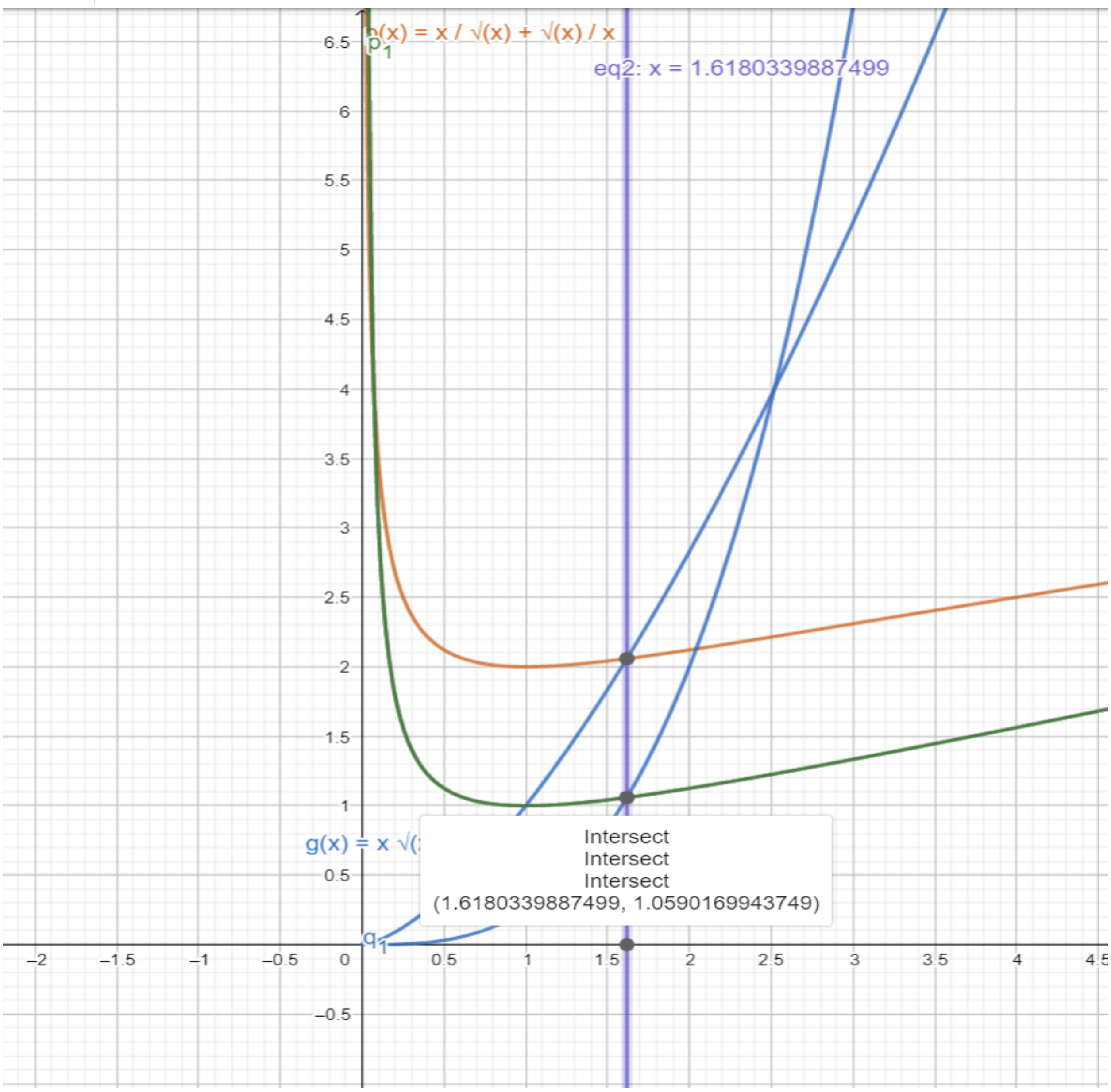
$$at\ \left(\frac{1}{\sqrt{x}}-\sqrt{x}\right) = 0\ THEN\ (x-1)^2 = 0$$



$$h_1(x) = \frac{1}{4}\left(\frac{1}{\sqrt{x}} - \sqrt{x}\right)^2 + 1$$

$$p_1(x) = \frac{1}{4}\left(\frac{1}{\sqrt{x}} + \sqrt{x}\right)^2$$

$$q_1(x) = \frac{1}{4}\left(x\sqrt{x}\right)^2$$



Riemann zeta function

We can transform zeta function to the next form by multiplying by (5 over pi) and because the Phi property $\left(\varphi - \frac{1}{\varphi}\right) = 1\,;which\ mean\ \varphi = (\varphi + 1)$

$$\frac{5}{\pi} * Z(S) = \frac{5}{\pi} * \sum_{n=0}^{\infty} \frac{1}{(n)^S} = \frac{5}{\pi} * \sum_{n=0}^{\infty} \frac{1}{(n)^S + 1}$$

$$\frac{5}{(\sqrt{2}+1)\pi} + \frac{5}{(\sqrt{3}+1)\pi} + \frac{5}{(\sqrt{5}+1)\pi} + \frac{5}{(\sqrt{7}+1)\pi} + \frac{5}{(\sqrt{11}+1)\pi} = \frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$

$$\frac{10}{(\sqrt{2}+1)\pi} + \frac{10}{(\sqrt{3}+1)\pi} + \frac{10}{(\sqrt{5}+1)\pi} + \frac{10}{(\sqrt{7}+1)\pi} + \frac{10}{(\sqrt{11}+1)\pi} = \frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{48\,\pi}$$

$$\frac{15}{(\sqrt{2}+1)\pi} + \frac{15}{(\sqrt{3}+1)\pi} + \frac{15}{(\sqrt{5}+1)\pi} + \frac{15}{(\sqrt{7}+1)\pi} + \frac{15}{(\sqrt{11}+1)\pi} = \frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{32\,\pi}$$

$$\frac{20}{(\sqrt{2}+1)\pi} + \frac{20}{(\sqrt{3}+1)\pi} + \frac{20}{(\sqrt{5}+1)\pi} + \frac{20}{(\sqrt{7}+1)\pi} + \frac{20}{(\sqrt{11}+1)\pi} = \frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{24\,\pi} = 10.1554243381\ldots$$

$$\frac{25}{(\sqrt{2}+1)\pi} + \frac{25}{(\sqrt{3}+1)\pi} + \frac{25}{(\sqrt{5}+1)\pi} + \frac{25}{(\sqrt{7}+1)\pi} + \frac{25}{(\sqrt{11}+1)\pi} = \frac{5*(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi} = 10.1554243381\ldots$$

$$\frac{30}{(\sqrt{2}+1)\pi} + \frac{30}{(\sqrt{3}+1)\pi} + \frac{30}{(\sqrt{5}+1)\pi} + \frac{30}{(\sqrt{7}+1)\pi} + \frac{30}{(\sqrt{11}+1)\pi} = \frac{6*(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi} = \frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{16\,\pi}$$

$$\frac{35}{(\sqrt{2}+1)\pi} + \frac{35}{(\sqrt{3}+1)\pi} + \frac{35}{(\sqrt{5}+1)\pi} + \frac{35}{(\sqrt{7}+1)\pi} + \frac{35}{(\sqrt{11}+1)\pi} = \frac{7*(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$

$$\frac{95}{(\sqrt{2}+1)\pi}+\frac{95}{(\sqrt{3}+1)\pi}+\frac{95}{(\sqrt{5}+1)\pi}+\frac{95}{(\sqrt{7}+1)\pi}+\frac{95}{(\sqrt{11}+1)\pi}$$
$$=\frac{19\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$

$$\frac{100}{(\sqrt{2}+1)\pi}+\frac{100}{(\sqrt{3}+1)\pi}+\frac{100}{(\sqrt{5}+1)\pi}+\frac{100}{(\sqrt{7}+1)\pi}+\frac{100}{(\sqrt{11}+1)\pi}$$
$$=\frac{20\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$
$$=\frac{5(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{24\,\pi}$$

$$\frac{105}{(\sqrt{2}+1)\pi}+\frac{105}{(\sqrt{3}+1)\pi}+\frac{105}{(\sqrt{5}+1)\pi}+\frac{105}{(\sqrt{7}+1)\pi}+\frac{105}{(\sqrt{11}+1)\pi}$$
$$=\frac{21\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$
$$=\frac{7(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{32\pi}$$

$$\frac{110}{(\sqrt{2}+1)\pi}+\frac{110}{(\sqrt{3}+1)\pi}+\frac{110}{(\sqrt{5}+1)\pi}+\frac{110}{(\sqrt{7}+1)\pi}+\frac{110}{(\sqrt{11}+1)\pi}$$
$$=\frac{22\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$
$$=\frac{11(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{48\pi}$$

$$\frac{115}{(\sqrt{2}+1)\pi}+\frac{115}{(\sqrt{3}+1)\pi}+\frac{115}{(\sqrt{5}+1)\pi}+\frac{115}{(\sqrt{7}+1)\pi}+\frac{115}{(\sqrt{11}+1)\pi}$$
$$=\frac{23\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$

$$\frac{120}{(\sqrt{2}+1)\pi}+\frac{120}{(\sqrt{3}+1)\pi}+\frac{120}{(\sqrt{5}+1)\pi}+\frac{120}{(\sqrt{7}+1)\pi}+\frac{120}{(\sqrt{11}+1)\pi}$$
$$=\frac{24\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{96\,\pi}$$
$$=\frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{12\,\pi}$$

$$\frac{120}{(\sqrt{2}+1)\pi}+\frac{120}{(\sqrt{3}+1)\pi}+\frac{120}{(\sqrt{5}+1)\pi}+\frac{120}{(\sqrt{7}+1)\pi}+\frac{120}{(\sqrt{11}+1)\pi}$$
$$=\frac{24\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-\ 1)(\sqrt{11}-\ 1)}{96\,\pi}$$
$$=\frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-\ 1)(\sqrt{11}-\ 1)}{12\,\pi}$$

The fractional form denominator will continue to increase, and decrease based of multiples of 5, and 2 until nominator reaches 480 and denominator reaches one pi in the fractional form

$$\frac{480}{(\sqrt{2}+1)\pi}+\frac{480}{(\sqrt{3}+1)\pi}+\frac{480}{(\sqrt{5}+1)\pi}+\frac{480}{(\sqrt{7}+1)\pi}+\frac{480}{(\sqrt{11}+1)\pi}$$
$$=\frac{96\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-\ 1)(\sqrt{11}-\ 1)}{96\,\pi}$$
$$=\frac{(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-\ 1)(\sqrt{11}-\ 1)}{\pi}$$

$$\frac{485}{(\sqrt{2}+1)\pi}+\frac{485}{(\sqrt{3}+1)\pi}+\frac{485}{(\sqrt{5}+1)\pi}+\frac{485}{(\sqrt{7}+1)\pi}+\frac{485}{(\sqrt{11}+1)\pi}$$
$$=\frac{97\,(5+c)(\sqrt{2}-1)(\sqrt{3}-1)(\sqrt{5}-1)(\sqrt{7}-\ 1)(\sqrt{11}-\ 1)}{96\,\pi}$$

An continue until it reaches again full multiplier of 12; 96 * 5 = {48, 32, 24, 16, 12, 8, 4 ,2 ,1}

The next set of 5 prime numbers will be {13 ,17, 19 ,23 ,29}

$$\frac{5}{(\sqrt{13}+1)\pi}+\frac{5}{(\sqrt{17}+1)\pi}+\frac{5}{(\sqrt{19}+1)\pi}+\frac{5}{(\sqrt{23}+1)\pi}+\frac{5}{(\sqrt{29}+1)\pi}$$
$$=\frac{(5+c)(13-1)(\sqrt{17}-1)(\sqrt{19}-1)(\sqrt{23}-\ 1)(\sqrt{29}-\ 1)}{236544\,\pi}$$

The next 5 prime numbers will be {31 ,37, 41, 43, 47}

$$\frac{5}{(\sqrt{31}+1)\pi}+\frac{5}{(\sqrt{37}+1)\pi}+\frac{5}{(\sqrt{41}+1)\pi}+\frac{5}{(\sqrt{43}+1)\pi}+\frac{5}{(\sqrt{47}+1)\pi}$$
$$=\frac{(5+c)(\sqrt{31}-1)(\sqrt{37}-1)(\sqrt{41}-1)(\sqrt{43}-\ 1)(\sqrt{47}-\ 1)}{16692480\,\pi}$$

If we took sum of 4 prime numbers each time, and add them together, we will have one term (4 + c) in the nominator

$$\frac{5}{(\sqrt{31}+1)\pi}+\frac{5}{(\sqrt{37}+1)\pi}+\frac{5}{(\sqrt{41}+1)\pi}+\frac{5}{(\sqrt{43}+1)\pi}$$
$$=\frac{(4+c)(\sqrt{31}-1)(\sqrt{37}-1)(\sqrt{41}-1)(\sqrt{43}-\ 1)}{362880\ \pi}$$

If we took sum of three prime numbers each time, and add them together we will have one term (3 + c) in the nominator

$$\frac{1}{(\sqrt{5}+1)\pi}+\frac{1}{(\sqrt{7}+1)\pi}+\frac{1}{(\sqrt{11}+1)\pi}=\frac{(3+c)(\sqrt{5}-1)(\sqrt{7}-1)(\sqrt{11}-1)}{240\ \pi}$$

So, we can say that if we Sum all N Prime numbers at once we will have term (N + c) term in the nominator.

$$Z(S) = 1+\frac{1}{2^S}+\frac{1}{3^S}+\frac{1}{4^S}+\frac{1}{5^S}+\frac{1}{6^S}+\frac{1}{7^S}\dots ..$$

$$Z(S) = \prod_{P\ Prime}\frac{1}{1-P^{-S}}$$

$$Z\left(\frac{1}{2}\right) = 1+\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{3}}+\frac{1}{\sqrt{4}}+\frac{1}{\sqrt{5}}+\frac{1}{\sqrt{6}}+\cdots ..$$

$$Z\left(\frac{-1}{2}\right) = \prod_{P\ Prime}\frac{1}{1-\sqrt{P}}$$

$$Z\left(\frac{-1}{2}\right) * \prod_{P\ Prime}(1-\sqrt{P}) = 1$$

THEN Sum for Primes series will be

$$ZP\left(\frac{-1}{2}\right) = \frac{1}{\sqrt{2}}+\frac{1}{\sqrt{3}}+\frac{1}{\sqrt{5}}+\frac{1}{\sqrt{7}}+\frac{1}{\sqrt{11}}+\frac{1}{\sqrt{13}}+\frac{1}{\sqrt{17}}\dots ..$$

$ZP\left(\frac{-1}{2}\right) = \frac{(5+c)\ \prod_2^N(\sqrt{P}-1)}{2^N\ \pi}$; *where C is constant of all compinations of multiplications* based on our previous examples of fractional forms for adding a series of 5 terms each time

$$ZP\left(\frac{-1}{2}\right) = \frac{(-1)^N(5+c)\ \prod_2^N(1-\sqrt{P})}{2^M\ \pi}$$

$$ZP\left(\frac{-1}{2}\right) = \frac{(-1)^N(5+c)}{2^M\ \pi} * \ Z\left(\frac{-1}{2}\right)$$

$$ZP\left(\frac{-1}{2}\right) = \frac{(-1)^N}{\pi} * \frac{(5+c)}{2^M} * \ Z\left(\frac{-1}{2}\right)$$

$$ZP\left(\frac{-1}{2}\right) = \frac{(-1)^N}{2^{M-1} * \ \pi} * \frac{(5+c)}{2} * \ Z\left(\frac{-1}{2}\right)$$

$$ZP\left(\frac{-1}{2}\right) = \frac{(-1)^N}{2^{M-1} * \pi} * f(\varphi) * \ Z\left(\frac{-1}{2}\right)$$

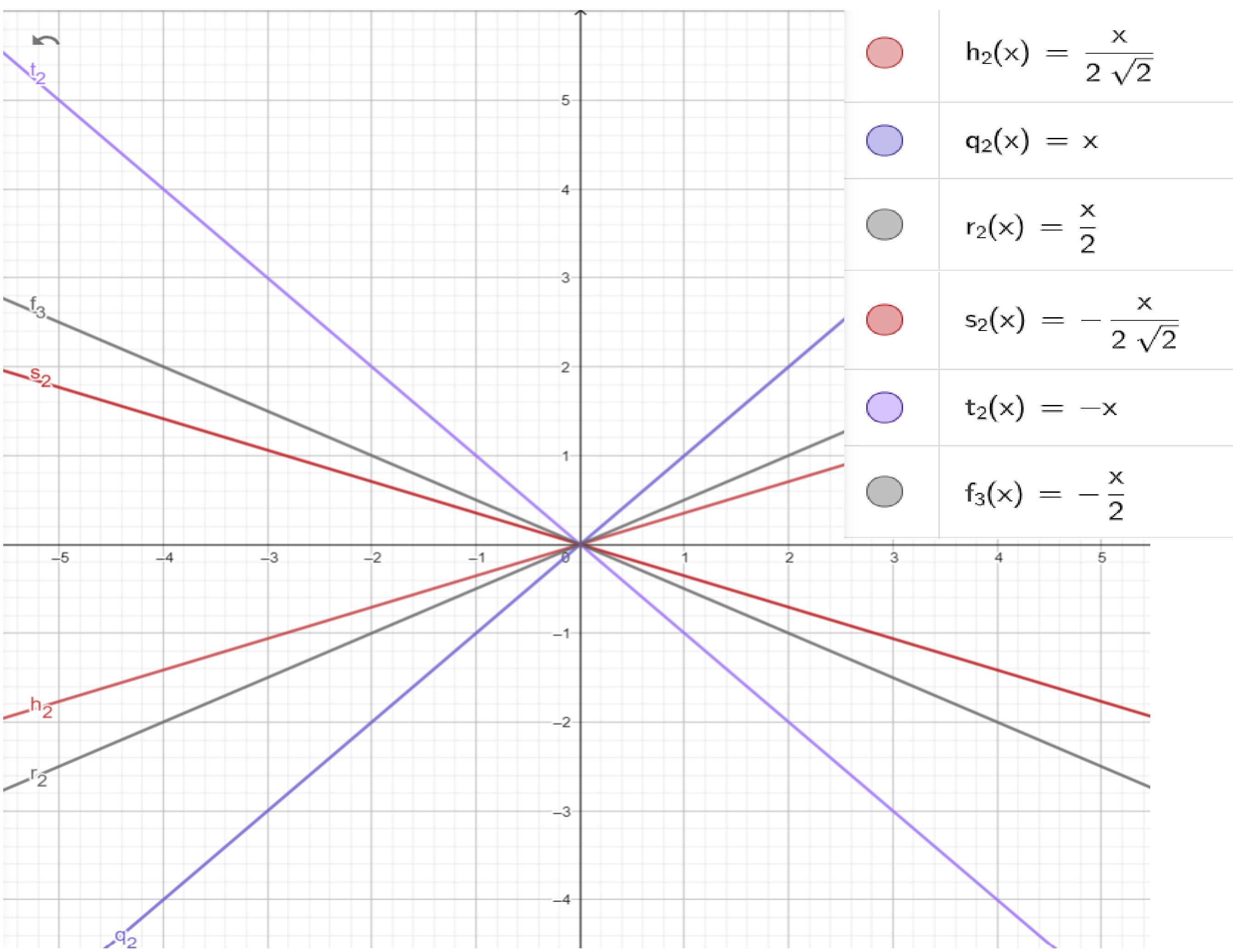
$$ZP\left(\frac{-1}{2}\right) = \frac{(-1)^N}{2^{M-1} * \pi} * f(\varphi) * \ Z\left(\frac{-1}{2}\right); WHERE\ f(\varphi)\ is\ a\ function\ of\ \left(\varphi = \frac{\sqrt{5}+1}{2}\right)$$

This $f(\varphi)$ depends on the number of prime terms added in zeta series. But at the end it will have φ

Which will give this 0.5 for all Prime numbers. And as we saw the golden ratio Phi have two at its denominator and as we proof all power of the main function goes back to the base relation for Phi

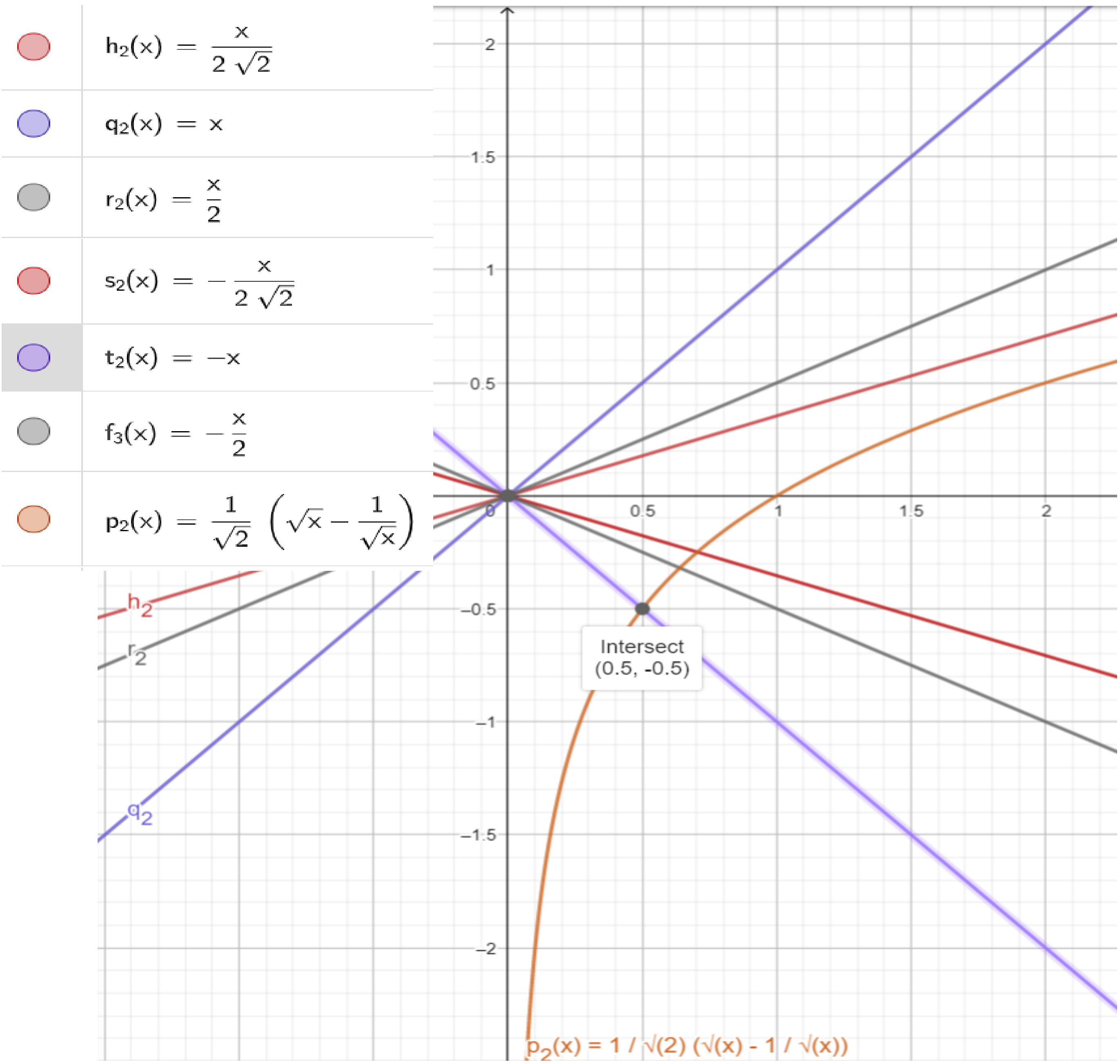
$$\varphi^{\frac{-1}{2}} + \varphi^{\frac{1}{2}} = \varphi^{\frac{3}{2}}$$

So prime numbers use the power two system, which means it use the square root of two axis in complex plane and not the original complex plane axis and φ is the determinate for this transformation between the systems.



And this matches our main equation to get the benefits of phi properties

$$\left(\sqrt{X}-\frac{1}{\sqrt{X}}\right)=\frac{1}{X\sqrt{X}}\ ;at\ X=2$$



This is an example for the (5 + c) term in the fraction form of the sum 5 prime terms = {31 ,37, 41 ,43, 47}

$$\frac{5}{(\sqrt{31}+1)\pi}+\frac{5}{(\sqrt{37}+1)\pi}+\frac{5}{(\sqrt{41}+1)\pi}+\frac{5}{(\sqrt{43}+1)\pi}+\frac{5}{(\sqrt{47}+1)\pi}$$

$$=\frac{\begin{pmatrix} 5+\sqrt{31}\sqrt{37}\sqrt{41}\sqrt{43}+\sqrt{31}\sqrt{37}\sqrt{41}\sqrt{47}+\sqrt{31}\sqrt{37}\sqrt{47}\sqrt{43}+\sqrt{47}\sqrt{37}\sqrt{41}\sqrt{43}+\cdots \\ +2\sqrt{31}\sqrt{37}\sqrt{41}+2\sqrt{31}\sqrt{47}\sqrt{41}+2\sqrt{31}\sqrt{43}\sqrt{41}+\cdots\ldots\ldots.. \\ +4\sqrt{31}+4\sqrt{37}+4\sqrt{41}+4\sqrt{43}+4\sqrt{47} \end{pmatrix}(\sqrt{31}-1)(\sqrt{37}-1)(\sqrt{41}-1)(\sqrt{43}-1)(\sqrt{47}-1)}{16692480\,\pi}$$

Conclusion

It is known that square root of 2 is irrational, this means that the value of the calculation's accuracy will be different from machine to another. In this paper we tried to avoid using pure calculations and instead tried to use fractional and functional forms. we used Phi as a basic unit to reference all functions to be based on Phi as a functional form not as value. Then we used this golden ratio and its functional properties to get the sum of Prime numbers for Zeta function in term of Pi and Phi.

References

Bogomolny, Alexander. "Square root of 2 is irrational".

^ *Fowler, David; Eleanor Robson (November 1998). "Square Root Approximations in Old Babylonian Mathematics: YBC 7289 in Context". Historia Mathematica. 25 (4): 368. doi:10.1006/hmat.1998.2209. Photograph, illustration, and description of the root(2) tablet from the Yale Babylonian Collection High resolution photographs, descriptions, and analysis of the root(2) tablet (YBC 7289) from the Yale Babylonian Collection*