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RELATION OF ANGLES WITH SIDES IN SUM EQUAL PRODUCT TYPE POLYGONAL SPIRAL

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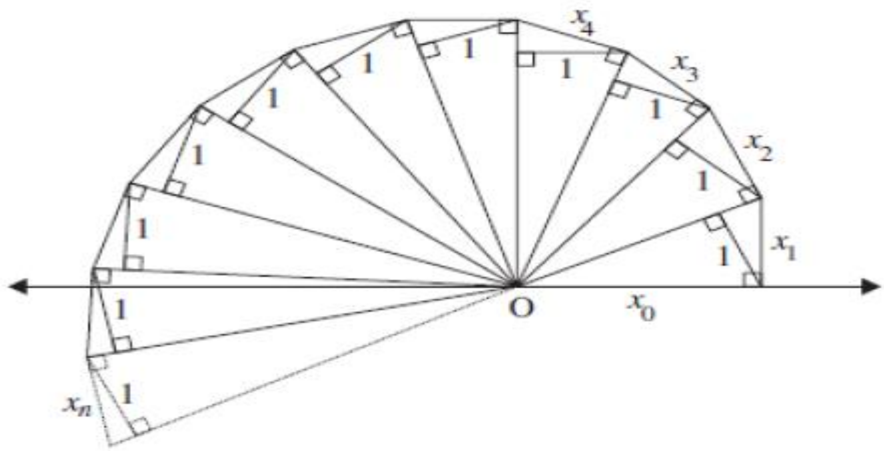

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Abstract

With reference to [1] in current paper we are introducing a new relation of angle with sides in sum equal product type polygonal spiral with the help of [1] main equation.

Keywords:- Spiral, Polygonal Spiral

1. Introduction

As there are many spirals have been easily seen in our daily and practical life and these are briefly studying in mathematics with the help of geometric theorems and methods some time algebraic series are also found for defining spirals, Fibonacci series is one of them which define golden spiral some peoples are also called it as Fibonacci spiral although there are many types of spirals as logarithmic spiral, Fermat's spiral, The Archimedean spiral etc.. But in this current paper we are discussing a new relation of angle with sides in sum equal product type polygonal spiral which is a small part of polygonal spiral and till now there is less amount of work on sum equal product type polygonal spiral can be seen on websites that’s why today we are try to working on it so, we’ll starts from Main result.

2. Main Result

For the figure 1

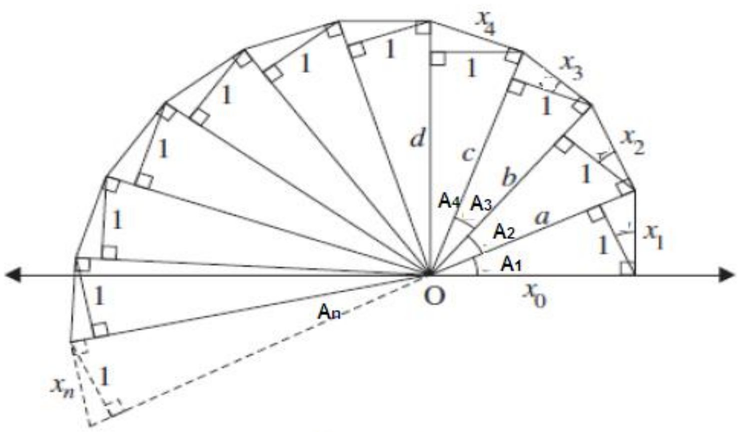

Figure 1.

$A_n = \mathrm{arcsec}(x_0 x_1 x_2 \cdots\cdots x_n)$ (1)

where, $n \in \mathbf{R}$, $\cos A_n = \sqrt{y_1 \cdot \cos A_1 \cdot \cos A_2 \cdot \cos A_3 \cdots\cdots \cos A_{n-1} \cdot \cos A_n}$

where, $n \in \mathbf{R}$ and $A_1, A_2, \ldots\ldots A_n$ are angles in figure 1 respectively.

3. Proof of the Main Result

First Equation

By [1] which is applicable for figure 2.

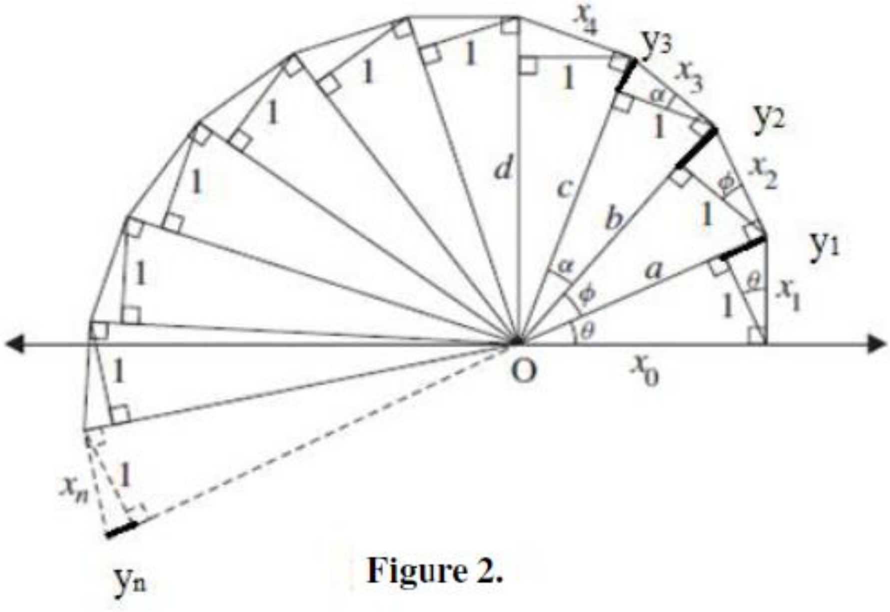

Figure 2.

$$y_n = \frac{x_n}{\prod_{n=0}^{(n-1)} x_n}$$

In figure 1, $y_n = x_n \cos A_n$ so, put it in above equation

$$x_n \cos A_n = \frac{x_n}{\prod_{n=0}^{(n-1)} x_n}, \cos A_n = \frac{1}{\prod_{n=0}^{(n-1)} x_n},$$

$$\prod_{n=0}^{(n-1)} x_n = \frac{1}{\cos A_n} \qquad (2)$$

$$\prod_{n=0}^{(n-1)} x_n = \sec(A_n), \qquad arc\sec\left(\prod_{n=0}^{(n-1)} x_n\right) = (A_n)$$

Second Equation

In this section of paper there is a generalization of above equation is introduce so, with the help of equation 1

$$\prod_{n=0}^{(n-1)} x_n = \frac{1}{\cos A_n} \ , \cos A_n = \frac{1}{\prod_{n=0}^{(n-1)} x_n}$$

Or $\cos A_n = \frac{1}{(x_0 x_1 x_2 \cdots\cdots x_{n-1})}$, $\cos A_n = \left(\frac{1}{x_o}\right)\left(\frac{1}{x_1}\right)\left(\frac{1}{x_2}\right)\cdots\cdots\left(\frac{1}{x_{n-1}}\right)$

As, $\frac{1}{x_o} = \sin A_1, \frac{1}{x_1} = \cos A_2, \frac{1}{x_2} = \cos A_3$ and $\frac{1}{x_{n-1}} = \cos A_{n-1}$

$$\cos A_n = \sin A_1 \cdot \cos A_2 \cdot \cos A_3 \cdots\cdots \cos A_{n-1}$$

multiply $\cos A_n$ on both side and divide $\cos A_1$on both side and hence

$$\frac{\cos^2 A_n}{\cos A_1} = \frac{\sin A_1}{\cos A_1} \cdot \cos A_2 \cdot \cos A_3 \cdots\cdots \cos A_{n-1} \cdot \cos A_n$$

In figure 1, $\frac{\sin A_1}{\cos A_1} = \tan A_1 = y_1$ so, $\frac{\cos^2 A_n}{\cos A_1} = y_1 \cdot \cos A_2 \cdot \cos A_3 \cdots\cdots \cos A_{n-1} \cdot \cos A_n$

$$\cos^2 A_n = y_1 \cdot \cos A_1 \cdot \cos A_2 \cdot \cos A_3 \cdots\cdots \cos A_{n-1} \cdot \cos A_n$$

$$\cos A_n = \sqrt{y_1 \cdot \cos A_1 \cdot \cos A_2 \cdot \cos A_3 \cdots\cdots \cos A_{n-1} \cdot \cos A_n} \qquad (3)$$

4. Conclusion

In this current paper there is a relation of angle with the sides of sum equal product type polygonal spiral have been introduce by author.

5. References

[1] Toyesh Prakash Sharma 'A New Property of sum equal product type Polygonal Spiral'-Geometry Article, Romanian Mathematical Magazine published on 11th may 2020.