The Fraction of the Segment in Three Parts

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Abstract In this work I present the method to divide with rule and the compass any segment given in three parts and also, the polynomials of degree one for the construction of the angle with rule and the compass: $b^2x - 2xa^2 + 2a^2 = 0$ (1) for any angle that belongs to an isosceles triangle. $(b')^2x - 2xa^2 + 2(a+n)^2 = 0$ (2) for any triangle which sum of two of his angles is minor to 90° , always $(2a > b)$; $(x > 1)$; $x = (2; 3; 4; 5; 6)$. $(b_x)^2p_1 - 2a^2p_1 + 2a^2p = 0$ (3) (p) prime number fixed, and $x = (p_1; p_2; p_3; \dots p_k)$; always $(p < p_1 < p_2 < \dots)$.

Keywords New Polynomial, Fraction Third with the Rule and the Compass

1. Introduction

We all know the minimal degree of a polynomial for any length construable with rule and the compass is a power of two. And also that can be constructed by the process origami or well by the rule marked with Arquimedes and Pergamo's Apolino. Hipias's trisectrix in a curve that we know that is projection is not possible.

The impossibility for the trisection of an angle is based on the need to have the cube root of a complex number.

Since well this is avoided applying the following process for the fraction $(y/3)$ in any segment.

2. My Results

We take the segment (AB) we plan his square (Figure 1) and in him, his respective diagonals, later we divide the segment (AB) by the half and from this one point we plan two lines to the opposite vertex, observe that they insert respectively in the diagonals; if now from each of these points we plan perpendicular lines (AB) we will have in (AB) three equal segments (c;d;a).

Demonstration:

For the (Figure 1) we have that:

$$a + n\sqrt{2} = AB$$

$$(n + m)\sqrt{2} = AB$$

therefore:

$a + n\sqrt{2} = (n + m)\sqrt{2}$; it implies that: $(m\sqrt{2} = a)$ and consequently.

$(a + d + c)\sqrt{2} = 2n + 2m$; as $(m = n/2)$ we have.

$(a + d + c)\sqrt{2} = 3n$

It is to say: $AB\sqrt{2} = 3n$; with which $(AB = 3n/\sqrt{2})$ we have demonstrated that $(a = d = c)$

Figure 1. Fraction of the segment AB in three.

Done the demonstration we happen to construct with rule and the compass a given angle; if we have the triangle (oba) (Figure 2) we take of reference the angle of the vertex (o) and the we increase three times.

Figure 2. Three times increase the angle of the triangle (oba)

His process is the following one, we plan two arches of respective radiuses $(0c)$ and $(0a)$ later with the compass, project the segment (ba) from the vertex (b) in the exterior arch and, from this point we return to project it in the interior arch, in this instant is triplicate the initial angle (we have formed a triangle that contains three times the triangle (oba)).

Now we happen to the inverse process, that is to say, to give of an angle limited by the sides $(0a)$ (Figure 3) to do the

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