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A GALLERY OF UNUSUAL SPIRALS

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Introduction

The general intention of this review is to present graphically several interesting *transcendental spirals* based on related polar formulae. The idea is partially rooted in a previous work [1], especially when speaking of so called *hyperlog-spirals*. As a separate chapter will be presented here four brand new spiraling transcendental curves, e.g. *thurals*. In fact, each and every of these graphs is an inspiration by itself.

1. Esthetics of q-spirals

From the proposed generalization [1]

$$r = a\,\mathrm{e}^{b\theta^{q}} \quad , \quad q \in Q$$

and based on different values of *q* parameter follows a palette of original spiraling curves under a possible term *hyperlog-spirals.* From now on, and for the sake of simplicity, let us call them shorter: *q-spirals*. Three the most fundamental such curves would be *logarithmic spiral*, *circle* and *hyperspiral,* or cases $q = 1$, $q = 0$ and $q = -1$, respectively.

It is quite possibly, even welcome, to analyze *q-spirals* both ways as one general geometrical entity or each separately but all that goes beyond the scope of this review. However, the choice of possible values for *q* here is mainly based on personal, esthetic reasons.

Finally, all the *q-spirals'* graphs are generated[1] using a natural simplification $a, b = 1$ and within different suitable but strictly allowed limits for θ .

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1 By Maxima & gnuplot

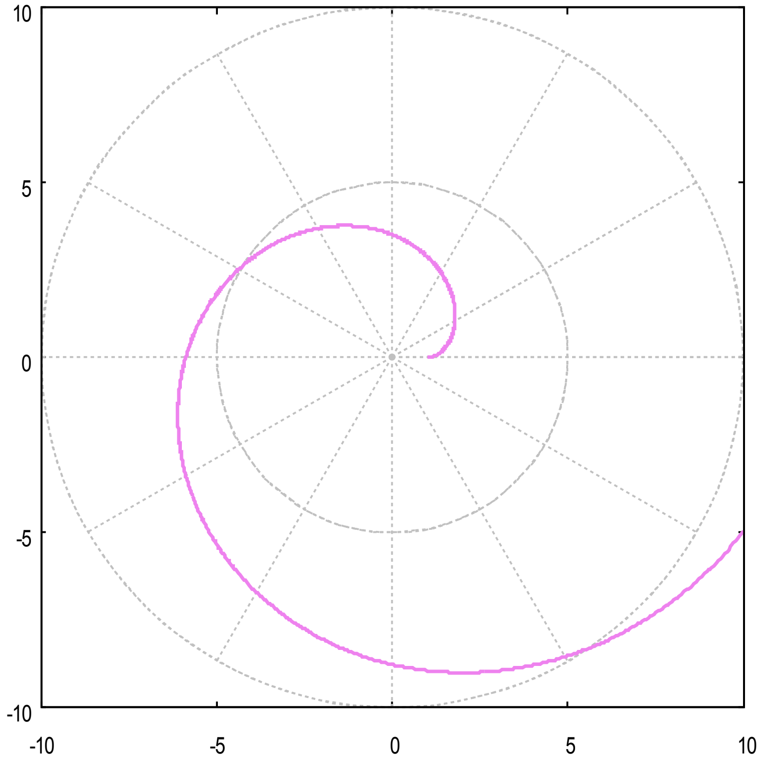

Fig. 1.1: *q = 1/2,* $0 < \theta \leq 4\pi$

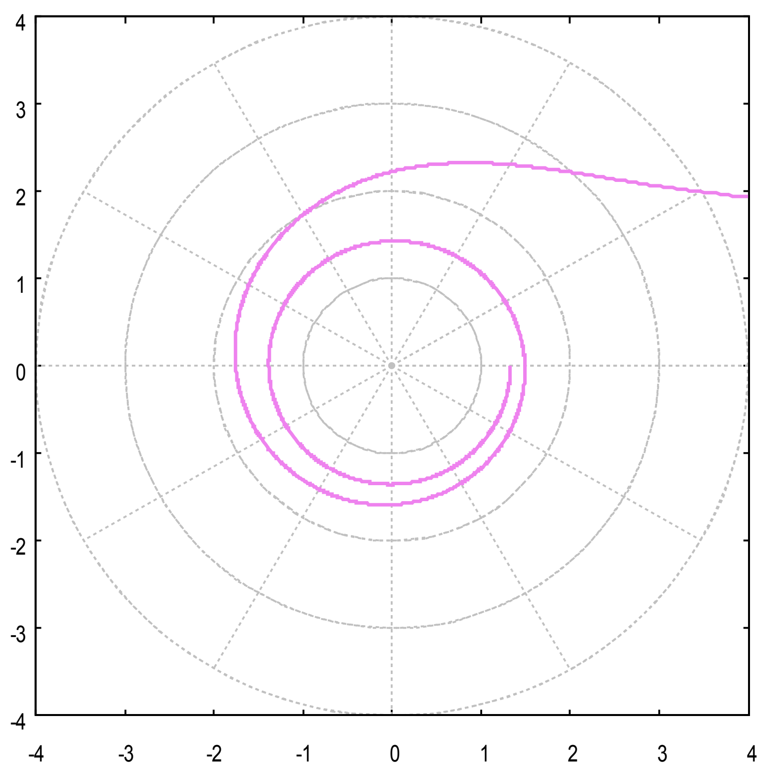

Fig. 1.2: *q = -1/2,* $0 < \theta \leq 4\pi$

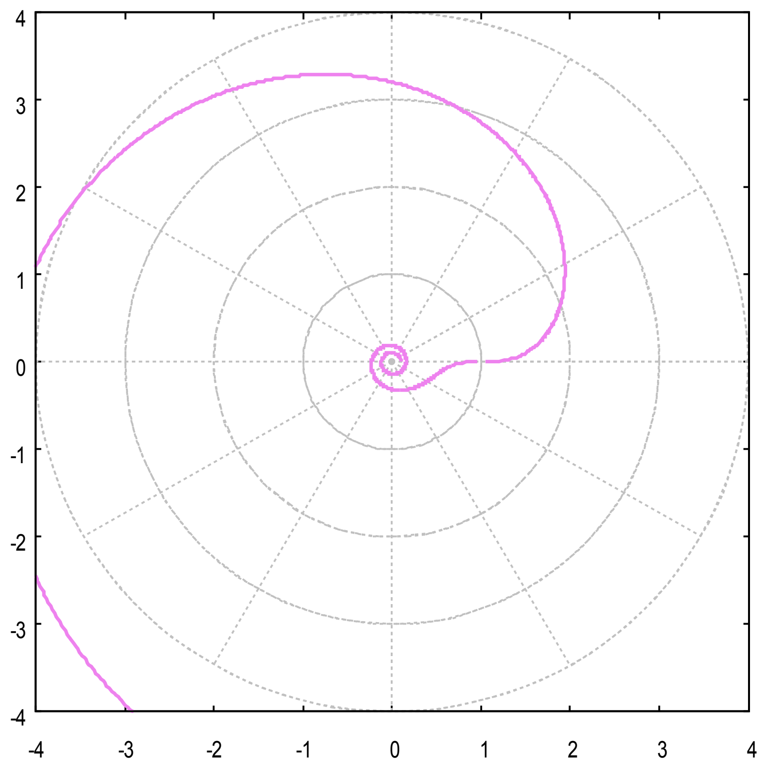

Fig. 1.3: *q = 1/3*, $-4\pi \le \theta \le 4\pi$

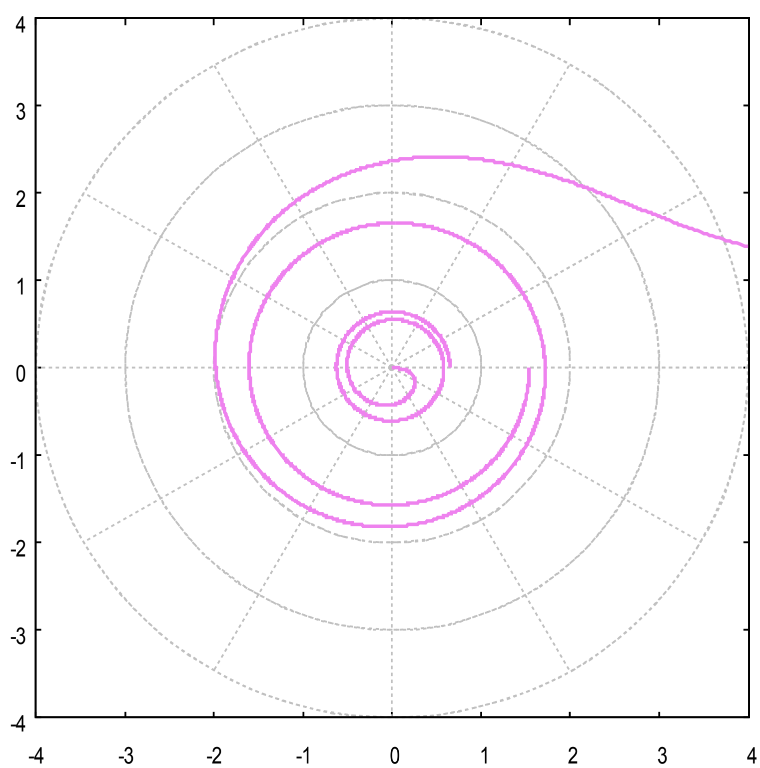

Fig. 1.4: *q = -1/3*, $-4\pi \le \theta \le 4\pi$

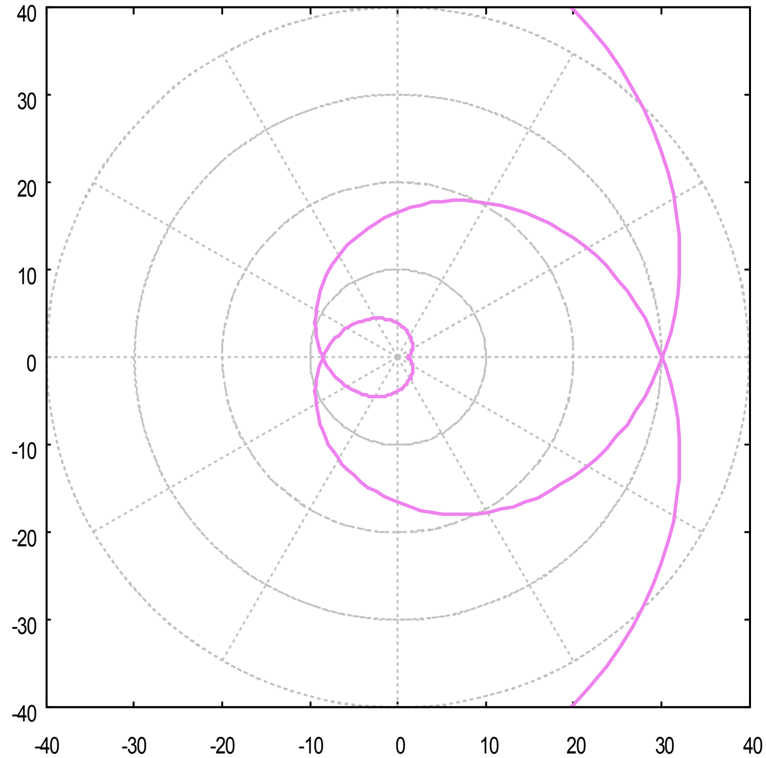

Fig. 1.5: *q = 2/3,* $-4\pi \le \theta \le 4\pi$

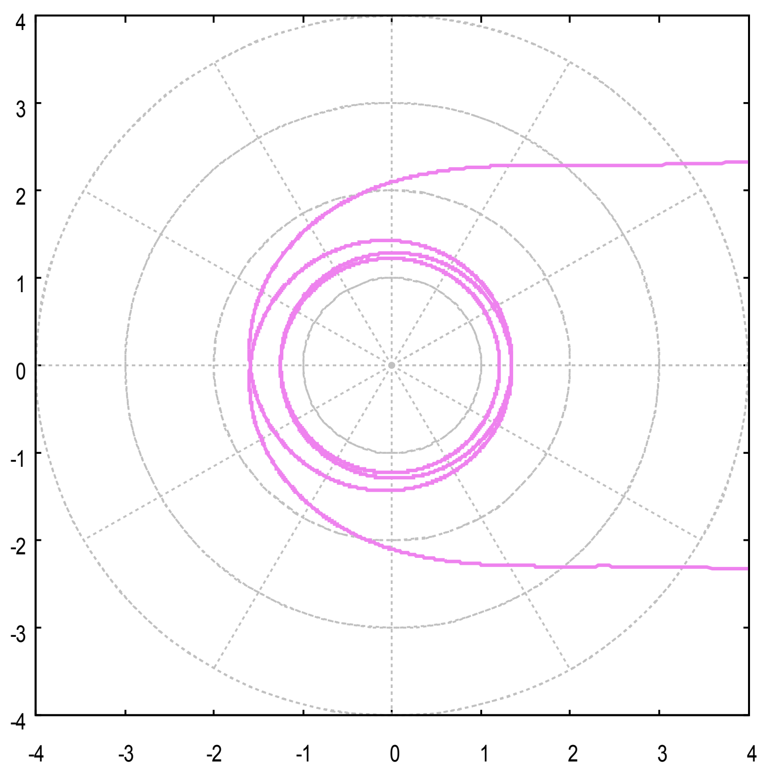

Fig. 1.6: *q = -2/3,* $-4\pi \le \theta \le 4\pi$

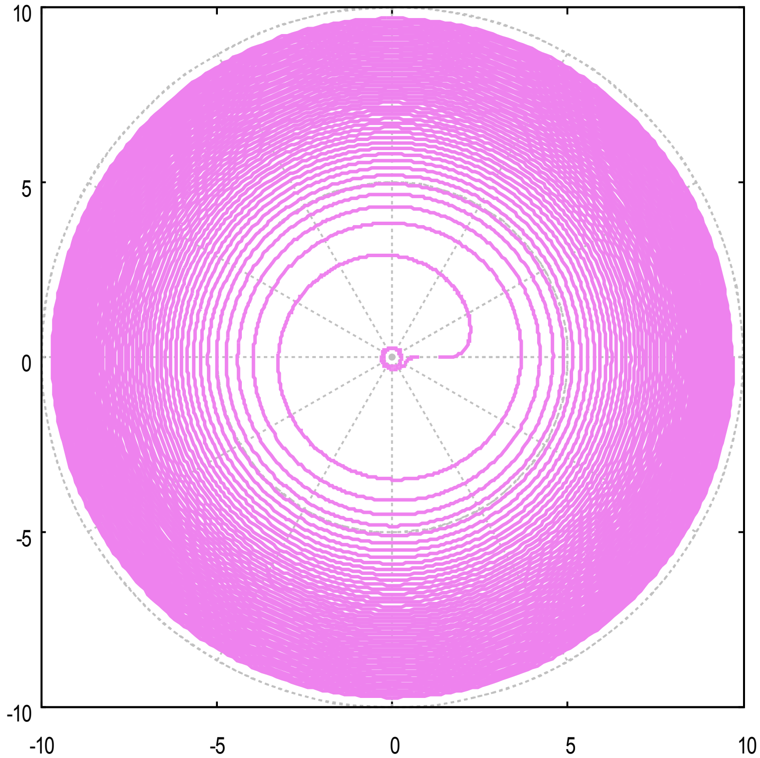

***Fig. 1.7**: q = 1/7,* $-4\pi \le \theta \le 100\pi$

2. Metaphysics of thurals

Four new, quite original transcendental curves (let us call them *thurals*) will be presented in this chapter. The very first one (Fig. 2.1) would be super-spiraling curve given with the polar formula

$$r=\theta^{\theta} \quad \text{or} \quad r=\mathrm{e}^{\theta \ln \theta} \quad ,$$

assuming $a, b=1$. The second *thural* (Fig. 2.2) is formally analogous to the above and defined with the formula

$$r=\theta^{-\theta} \quad .$$

The idea for its name comes naturally: *c-curve.* Finally, the last two spirals (Figs. 2.3 and 2.4) in this review would be defined with the formulae

$$r=\theta^{1/\theta} \quad \text{and} \quad r=\theta^{-1/\theta} \quad .$$

Loop is what comes in one's mind when one takes a look at both curves, respectively.

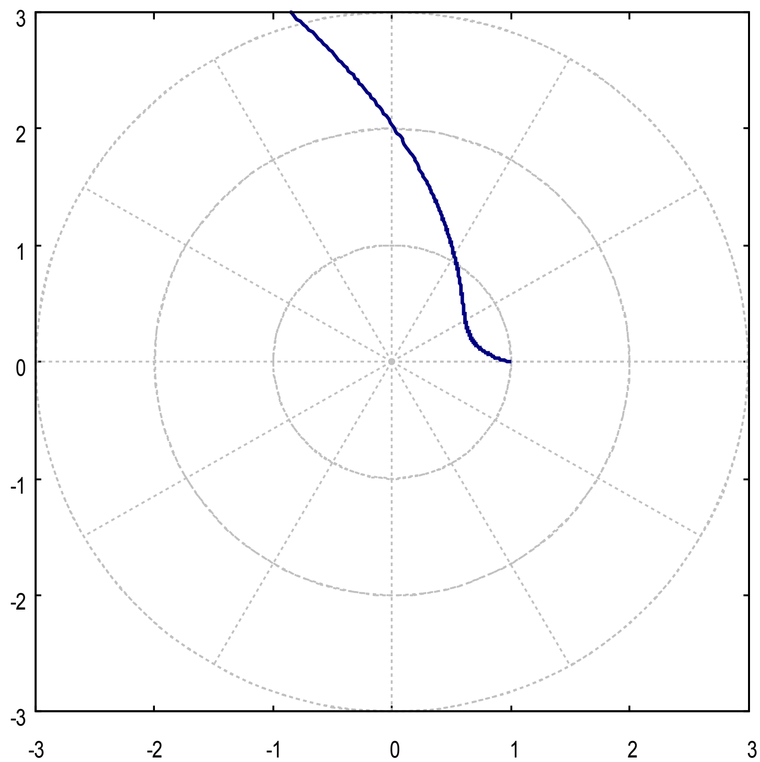

Fig. 2.1*: s-spiral,* $0 < \theta \leq 4\pi$

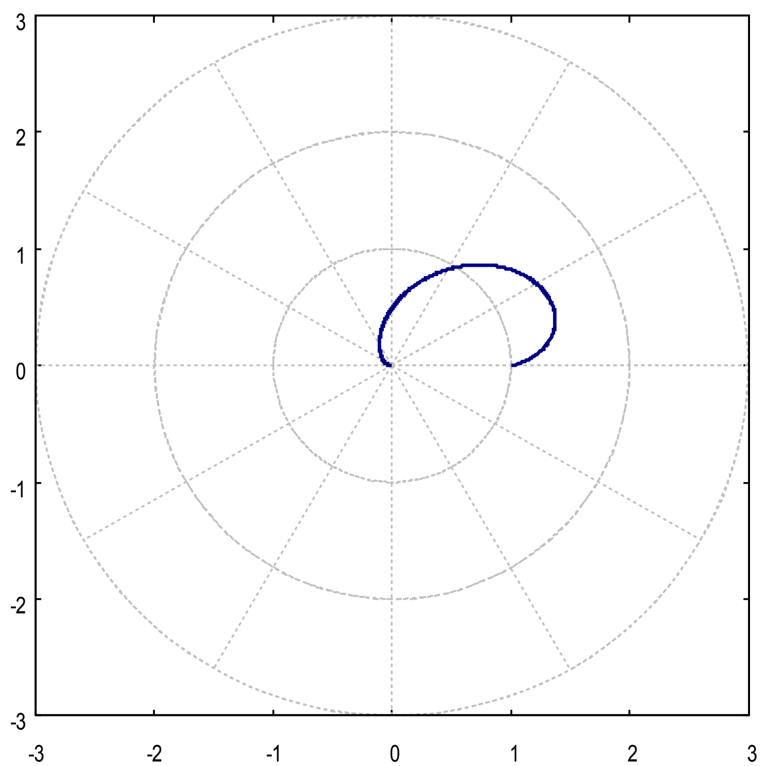

Fig. 2.2*: c-curve,* $0 < \theta \leq 4\pi$

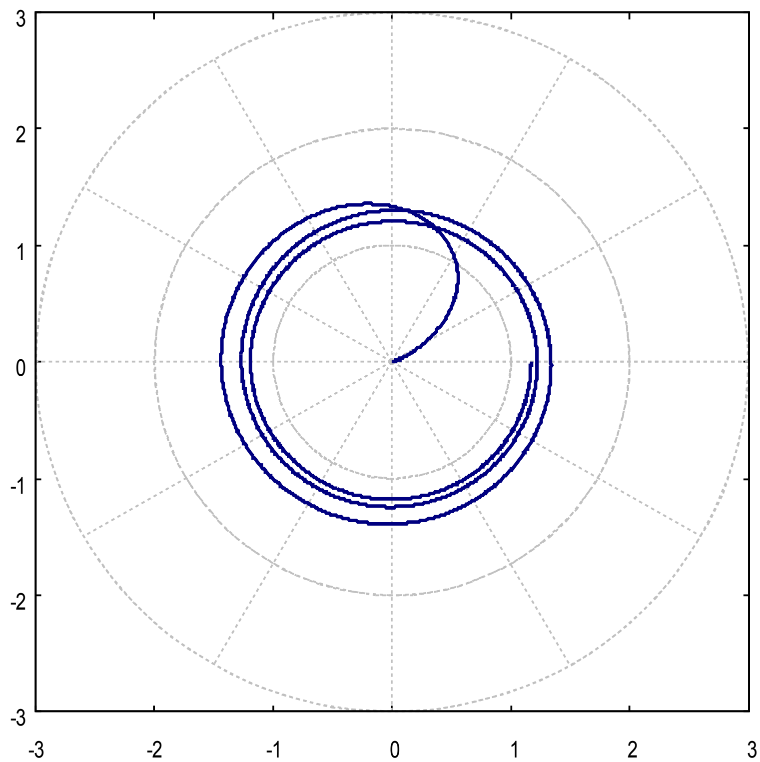

Fig. 2.3*: super-loop,* $0 < \theta \leq 6\pi$

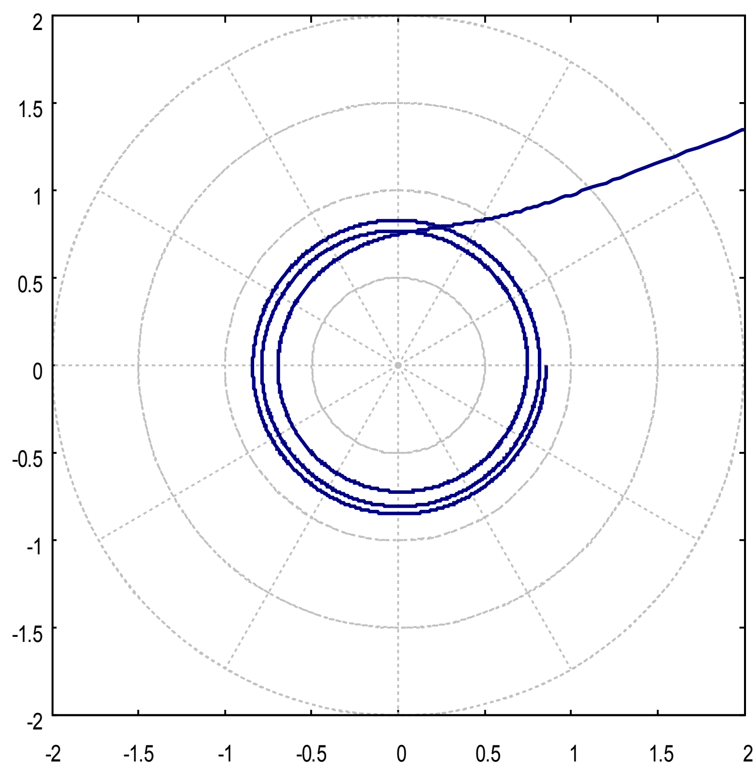

Fig. 2.4*: sub-loop,* $0 < \theta \leq 6\pi$

Gratitude

To my mother Stoja, a fairy, with Love.

To my dear friend and great soul Nermin Jakirilić, cordially.

Acknowledgments

I would like to mention a permanent inspiration of the divine opus of Albrecht Dürer. We met about 532 years after. Part of that is spiritual entusiasm of a dear friend Sava Kuzminac. Many thanks to Dr. Igor Sandalj, a real sport, for the book [2].

One long, friutfull discussion with Mr. Saša Doder was helpfull in clarifying a role of the mathematical software as well as domains of the polar functions.

Last but not least, I wold like to dedicate a few of these spirals to the mathematical class 1974-78, Banja Luka, as well as to dear professors Boško Ćulibrk and Jelena Selec.

References

[1] Turanyanin, D. On Hyperspiral, General Science Journal, (2012) gsjournal.net/Science-Journals/Essays/View/4393

[2] Dürer, A. Unterweisung der Messung, Nürnberg (1525), Sändig Reprint Verlag, Vaduz (2006)