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ABOUT THE COVER: ARE "OLD" MATHEMATICS BOOKS "COLLECTIBLE"?

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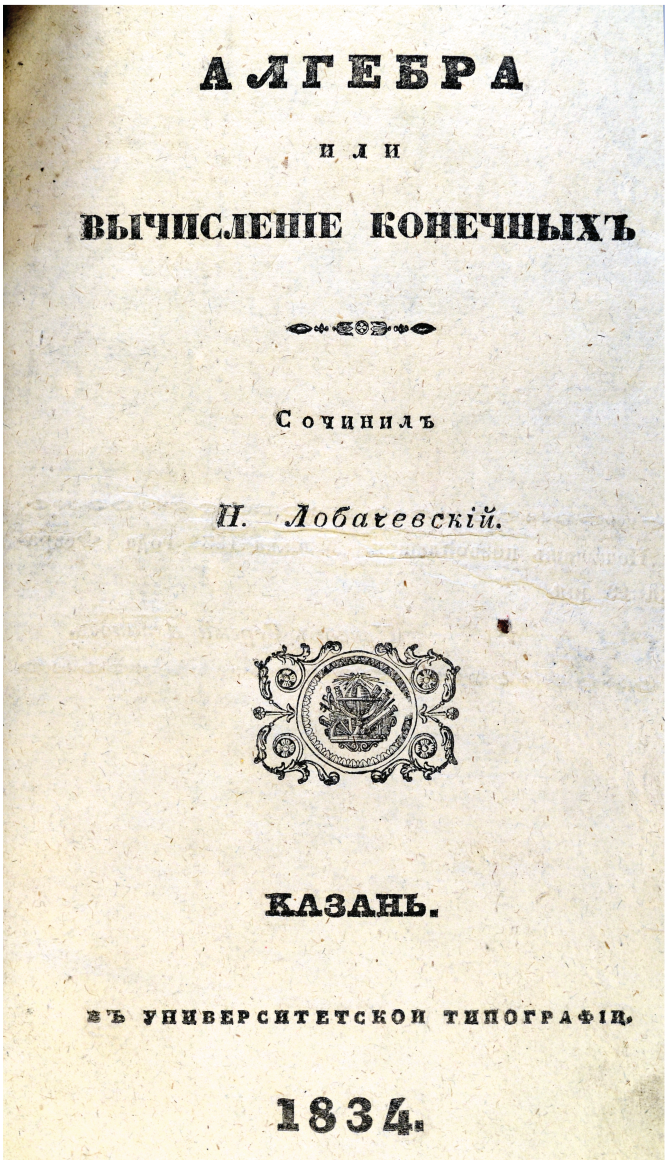
The answer to the question in the title is, "Yes and no." Clearly, the first printed version of Euclid's *Elements* (see [2] and [4, Ratdolt, 1482]) is, not surprisingly, quite valuable—priced recently at $95,000. As printed books go, it is old, following by roughly 30 years the book often thought to be the first book printed with movable type (the 42-line Bible also known as the Gutenberg Bible). The Ratdolt book is important not only for its age, but it is a startlingly beautiful book with interesting content [4]. Another mathematics book is without doubt collectible, meeting all reasonable criteria: Gauss's *Disquisitiones Arithmeticae* of 1801 [1]—the author was a great mathematician and the book is filled with important mathematical ideas (listed by a Danish dealer for $58,000). There is however another category of revered mathematics books—those with an important author, though without great content, but exceedingly rare. A few years ago we wrote about a book of Euler's, *Tumultuariae*, when a copy came on the market ($15,000); only one other copy was known to exist and that was in the library of the University of Basel. The content is of little interest (a commentary on a thesis defense at the University of Basel), but the author was Euler, written in 1722 when Euler was only 15 years old.

In this note we call attention to a book published in 1834 [3] by Nikolai Lobachevsky, well after the appearance of the few pages for which he is known—the small piece on noneuclidean geometry. That early work of Lobachevsky came along in 1829–30 and was revolutionary, albeit only 135 pages long. The work we note here ran to 528 pages and appeared many years later: Lobachevsky's *Algebra* is an almost forgotten book; see Figures 1 and 2. The author was famous for other works, but this book is valuable because it is so exceedingly scarce. There is a copy in Kazan (where Lobachevsky was a professor and rector at the university), and another copy is thought to be in the Moscow State Library. Another is recorded as being at Harvard, and there is an additional one in a private collection in San Jose, California. Our copy was purchased by us from Bernard Quaritch (London) at the

50th Antiquarian Book Fair in Oakland, California in February of 2017; purchase price, $15,000.

In the book, Lobachevsky demonstrates a new method for the approximation of the roots of algebraic equations, separating the roots of a polynomial by squaring them repeatedly (today called the *Graeffe method* or *Dandelin–Lobachevsky–Graeffe method*). Lobachevsky started working on *Algebra* as a course of lectures at the University of Kazan as early as 1825, but the work was rejected by the censors, apparently for political reasons.



АЛГЕБРА

или

ВЫЧИСЛЕНІЕ КОНЕЧНЫХЪ

Сочинилъ

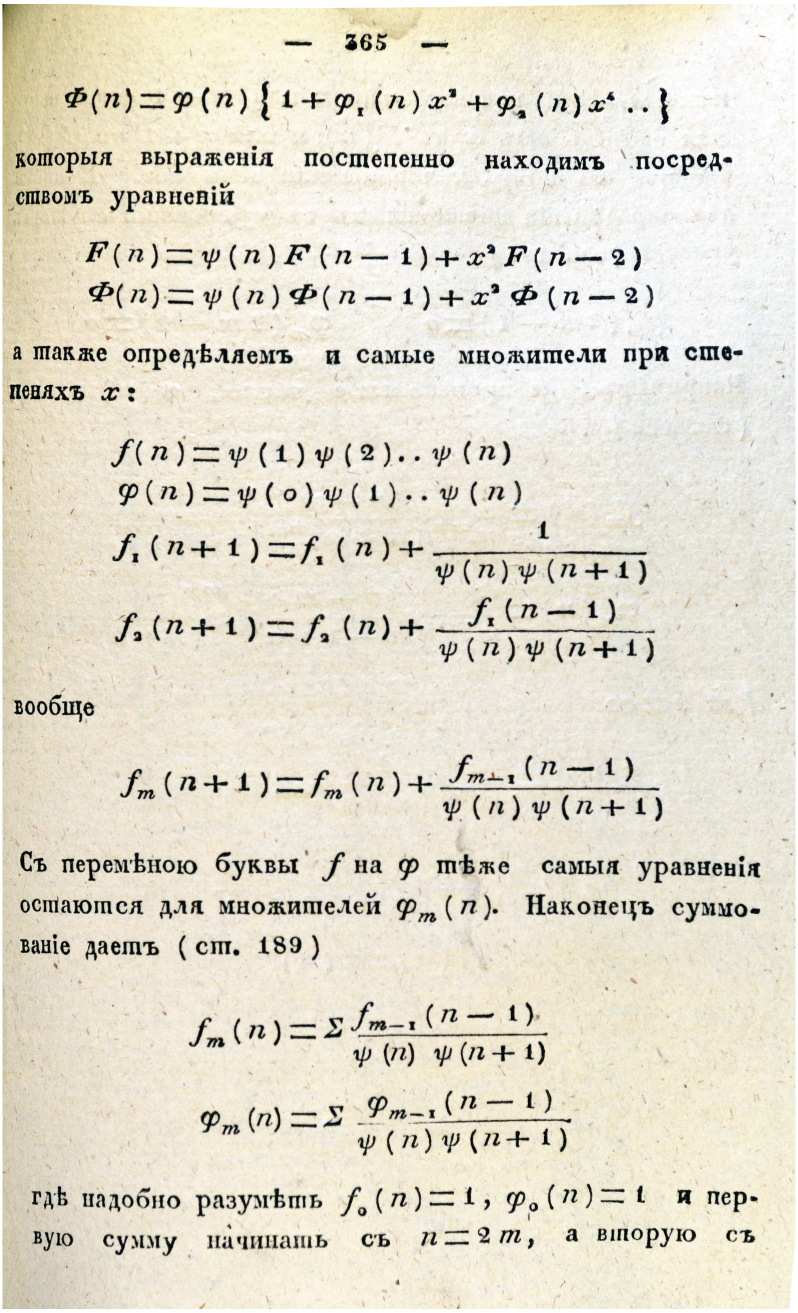
Н. Лобачевскій.

КАЗАНЬ.

въ университетской типографіи.

1834.

Figure 1. Clear copy of the cover. The title page of Lobachevsky's *Algebra or calculus of finites* [3]



— 365 —

$$\Phi(n)=\varphi(n)\left\{1+\varphi_1(n)x^2+\varphi_2(n)x^4\,..\right\}$$

которыя выраженія постепенно находимъ посредствомъ уравненій

$$F(n)=\psi(n)F(n-1)+x^2F(n-2)$$
$$\Phi(n)=\psi(n)\Phi(n-1)+x^2\Phi(n-2)$$

а также опредѣляемъ и самые множители при степеняхъ x:

$$f(n)=\psi(1)\psi(2)\,..\,\psi(n)$$
$$\varphi(n)=\psi(0)\psi(1)\,..\,\psi(n)$$
$$f_1(n+1)=f_1(n)+\frac{1}{\psi(n)\psi(n+1)}$$
$$f_2(n+1)=f_2(n)+\frac{f_1(n-1)}{\psi(n)\psi(n+1)}$$

вообще

$$f_m(n+1)=f_m(n)+\frac{f_{m-1}(n-1)}{\psi(n)\psi(n+1)}$$

Съ перемѣною буквы f на φ тѣже самыя уравненія остаются для множителей $\varphi_m(n)$. Наконецъ суммованіе даетъ (ст. 189)

$$f_m(n)=\Sigma\frac{f_{m-1}(n-1)}{\psi(n)\,\psi(n+1)}$$
$$\varphi_m(n)=\Sigma\frac{\varphi_{m-1}(n-1)}{\psi(n)\psi(n+1)}$$

гдѣ надобно разумѣть $f_0(n)=1$, $\varphi_0(n)=1$ и первую сумму начинать съ $n=2m$, а вторую съ

FIGURE 2. A page from [3] with provacative formulas.

References

[1] Gauss, Karl Friedrich. *Disquisitiones Arithmeticae.* Leipzig, Fleischer, Jun. 1801.
[2] Horblit, Harrison. *Euclid. One Hundred Books Famous in Science.* Grolier Club, New York, 1964, #27.
[3] Lobachevsky, Nikolai Ivanovich. *Algebra or Calculus of Finites* (Russian). University Press, Kazan, 1834.
[4] Ratdolt, Erhard. *Opus Elementorum... In Artem Geometriae.* Venice, 1482.

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