Greek numerals and word values: the Greek number of the beast

A Mathematica package, its documentation and application

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Start (subsection for the initialisation packages)

Abstract

The ancient Greeks used their alphabet also as numerals, using an apostroph, acute accent or prime for the distinction. With α' = 1 and β' = 2 and ι' = 10, then ια' = 11 and βι' = 12, since the value of the letters mattered and they did not have a place value system. The 1000s were denoted with the "hasta" (a subscript prime, U + 0375), with ͵α' = 1000 and ͵β' = 2000 etcetera. In Mathematica 13.1 the routine IntegerString translates Hindu-Arabic numbers into Greek, e.g. 1101 → ͵αρα΄. There is no built-in inverse however. This is provided in the present package. There is the issue of using ϝ' = 6 or ς' = 6. Latin letters might be used for ease of input. An application is the calculation of "the number of the beast" 666, as calculated by the Apostle John in the Book of Revelations. The "word value" of a name of a person can be determined via addition of the values of the separate letters, like Ζ' + ε' + υ' + ς' = 7 + 5 + 400 + 6 = 418.

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Introduction

The ancient Greeks used their alphabet also as numerals, using an apostroph, acute accent or prime for the distinction. With α' = 1 and β' = 2 and ι' = 10, then ια' = 11 and βι' = 12, since the value of the letters mattered and they did not have a place value system. The 1000s were denoted with the "hasta" (a subscript prime, U + 0375), with ͵α' = 1000 and ͵β' = 2000 etcetera. See the construction below.

A discussion is given at MathWorld, see https://mathworld.wolfram.com/GreekNumerals.html, with a Demonstrations project by Stephen Wolfram (2011) at https://demonstrations.wolfram.com/GreekNumerals/. Another online converter is at http://www.russellcottrell.com/greek/utilities/greeknumberconverter.htm.

This kind of numbering is of little use nowadays but it arises in discussions about history. A particular application is a form of cryptography, where a name like Zeus or Achilles is coded to have a particular word-value. The word value of Ζεύς would for example be Ζ' + ε' + υ' + ς' = 418. This number 418 would properly be written as υ ι η΄, with υ = 400, ι = 10, and η = 8. There would be more words with the word value of 418 of course.

My attention was drawn to the issue because of a new paper by Francesco Carotta (2022) who has a new suggestion for the decoding of "the number of the beast" 666, which occurs in the Gospel by John, a.k.a. the Book of Revelations or the Apocalypse. Over the millennia various authors have suggested various decodings, and these calculations can be somewhat tedious. It seemed helpful to write some routines. The paper by Carotta is here: https://dejister.wordpress.com/2022/10/13/apokalypse-francesco-carotta/

Since it is somewhat awkward to type Greek letters on a Western keyboard, there is an option to use Western letters.

We adopt Stephen Wolfram's basic algorithm for the Greek numerals, but while he used a Row[{...}] statement with a Subscript Prime, we rather use the unicode hasta so that a numeral can remain a String, as in IntegerString.

Routines in the package

```
?Cool`MathEd`AncientGreekNumerals`*
```

Cool`MathEd`AncientGreekNumerals`

AlphabetN	ToLatinN	WordValueN	$GreekThousands	$LatinTens	$WauToStigma
GreekToArabicN	ToLATINN	$GreekHundreds	$GreekUnits	$LatinThousands	
ToGreekN	TranscribeN	$GreekN	$LatinHundreds	$LatinUnits	
ToGREEKN	TUC	$GreekTens	$LatinN	$NumberN	

What is present in Mathematica 13.1

A basic routine is available in Mathematica in the following manner.

```
g1 = IntegerString[101, "Greek"]
```

PA´

```
% // FullForm
```

"\[CapitalRho]\[CapitalAlpha]\264"

```
g2 = IntegerString[1101, "GreekLower"]
```

͵αρα´

```
% // FullForm
```

"\:0375\[Alpha]\[Rho]\[Alpha]\264"

Unfortunately, the conversion of Greek numerals into Hindu-Arabic numerals is currently not supported by Mathematica.

```
FromDigits[g1, "Greek"]
```

••• FromDigits: The expression PA´ is not a list of digits or a string of valid digits.

FromDigits[PA´, Greek]

```
FromDigits[g2, "GreekLower"]
```

••• FromDigits: The expression ͵αρα´ is not a list of digits or a string of valid digits.

FromDigits[͵αρα´, GreekLower]

The current package allows for a translation from $0 < x < 10000$ = myriad from the Greek x into Hindu-Arabic numerals.

The general structure of Greek numerals

The numbers 1 - 999 and the thousands 1000 - 9999 can be constructed as additions on the following matrix elements.

```
$NumberN
```

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 10 & 20 & 30 & 40 & 50 & 60 & 70 & 80 & 90 \\ 100 & 200 & 300 & 400 & 500 & 600 & 700 & 800 & 900 \\ 1000 & 2000 & 3000 & 4000 & 5000 & 6000 & 7000 & 8000 & 9000 \end{pmatrix}$$

With these correspond the following Greek letters, both lower case and upper case, and using the hasta for the thousands. Observe that we require 27 letters, and that we use special letters koppa ϟ and sampi ϡ. Less seen is also the capital stigma Ϛ. The order of the common Greek alphabet is maintained, but little used symbols are inserted, which is somewhat curious, since they are used as numerals.

```
Alphabet["Greek"]
```

$\{\alpha, \beta, \gamma, \delta, \varepsilon, \zeta, \eta, \theta, \iota, \kappa, \lambda, \mu, \nu, \xi, o, \pi, \rho, \sigma, \tau, \upsilon, \varphi, \chi, \psi, \omega\}$

```
$GreekN
```

$$\begin{pmatrix} \alpha & \beta & \gamma & \delta & \epsilon & \varsigma & \zeta & \eta & \theta \\ \iota & \kappa & \lambda & \mu & \nu & \xi & o & \pi & \varrho \\ \rho & \sigma & \tau & \upsilon & \phi & \chi & \psi & \omega & \varpi \\ ,\alpha & ,\beta & ,\gamma & ,\delta & ,\epsilon & ,\varsigma & ,\zeta & ,\eta & ,\theta \end{pmatrix}$$

```
$GreekN // TUC
```

$$\begin{pmatrix} \mathrm{A} & \mathrm{B} & \Gamma & \Delta & \mathrm{E} & \mathrm{Z} & \mathrm{Z} & \mathrm{H} & \Theta \\ \mathrm{I} & \mathrm{K} & \Lambda & \mathrm{M} & \mathrm{N} & \Xi & \mathrm{O} & \Pi & \mathrm{P} \\ \mathrm{P} & \Sigma & \mathrm{T} & \mathrm{Y} & \Phi & \mathrm{X} & \Psi & \Omega & \mathrm{C} \\ ,\mathrm{A} & ,\mathrm{B} & ,\Gamma & ,\Delta & ,\mathrm{E} & ,\mathrm{Z} & ,\mathrm{Z} & ,\mathrm{H} & ,\Theta \end{pmatrix}$$

Our routines generate the same outcomes as the standard routine IntegerString as above, except for Digamma, Wau and Stigma, see below.

```
{ToGREEKN[101], ToGreekN[1101]}
```

$\{\mathrm{PA}', ,\alpha\rho\alpha'\}$

The following is a transpose of the combinations.

```
$GreekN + ($GreekN // TUC) /. Plus → "";
```

```
Riffle[%, $NumberN] // Transpose // TableForm
```

(α, A)	1	(ι, I)	10	(ρ, P)	100	(ʹα, ʹA)	1000
(β, B)	2	(κ, K)	20	(σ, Σ)	200	(ʹβ, ʹB)	2000
(γ, Γ)	3	(λ, Λ)	30	(τ, T)	300	(ʹγ, ʹΓ)	3000
(δ, Δ)	4	(μ, M)	40	(υ, Υ)	400	(ʹδ, ʹΔ)	4000
(ε, E)	5	(ν, N)	50	(φ, Φ)	500	(ʹε, ʹE)	5000
(ϛ, Ϛ)	6	(ξ, Ξ)	60	(χ, X)	600	(ʹϛ, ʹϚ)	6000
(ζ, Z)	7	(ο, O)	70	(ψ, Ψ)	700	(ʹζ, ʹZ)	7000
(η, H)	8	(π, Π)	80	(ω, Ω)	800	(ʹη, ʹH)	8000
(θ, Θ)	9	(ϙ, Ϙ)	90	(ϡ, Ϡ)	900	(ʹθ, ʹΘ)	9000

An inverse, from Greek to Arabic numerals

```
?GreekToArabicN
```

Symbol

GreekToArabicN[x_String] for 0 < x < 10000 = myriad, gives Greek number x in Arabic cyphers.

The routine does not test upon the order of units, tens, or hundreds. $WauToStigma[] is applied

```
IntegerString[1101, "GreekLower"]
```

ʹαρα΄

```
GreekToArabicN[%]
```

1101

Observe that the Greek numerals have no “place value system”, so the order of the letters does not make a difference for units, tens and hundreds. In this case, the two alpha’s have a different effect, because of the hasta at the beginning.

```
GreekToArabicN ["ʹαα΄ρ΄"]
```

1101

Digamma: Wau instead of Stigma in IntegerString

Apparently both ϝ‘ = 6 and ϛ‘ = 6 are in use. Wikipedia (a portal and no source) has an enlightening entry on Digamma. The shape of the letter went through two “stacked gammas” F to ϛ in some steps. The first F can be called Digamma / Wau and the last ϛ Digamma / Stigma.

Jannaris (1907) explains that it is a common misunderstanding that the Greeks would use ϝ' = 6 (digamma / wau). Consistent use was made in Alexandria and Byzantium of ϛ' = 6 (stigma). We indeed find this on the website by Russell Cottrell.

Jannaris provides for an intermediate shape of Digamma / Stigma as ⅁ as well, which later was rotated. Unfortunately, the use of digamma / wau is hardcoded in Mathematica, not only with the letter

Ͱ

\ [Digamma] but also in IntegerString. A suggestion to the makers of Mathematica is to provide an option on the choice. The letter \ [Wau] is not encoded yet. For the present package, it is wiser to stick with Jannaris (1907) and Cottrell, and to provide a quick fix for applications of IntegerString.

```
g3 = IntegerString[6, "GreekLower"]
```

ϝ´

```
g3 // $WauToStigma
```

ϛ´

```
g3 = IntegerString[666, "GreekLower"]
```

χξϝ´

```
% // $WauToStigma
```

χξϛ´

The replacement of Digamma (wau) by Stigma has been built in the inverse function, that is provided in this package.

```
GreekToArabicN[g3]
```

666

The possibility of using Latin letters

For ease of input, we can use Latin letters. Observe that this method thus differs from Roman numerals, such as MLX = 1060. With 26 letters we need one more, and let us keep using the sampi for 900. Also, the Greek upsilon *υ* and capital Y give different letters in the Latin alphabet. Some choices must be made, and there appears to be no standard choice. The following seems useful.

```
$LatinN
```

a	b	g	d	e	c	z	h	j
i	k	l	m	n	x	o	p	q
r	s	t	u	f	y	v	w	ϡ
,a	,b	,g	,d	,e	,c	,z	,h	,j

```
$LatinN // TUC
```

A	B	G	D	E	C	Z	H	J
I	K	L	M	N	X	O	P	Q
R	S	T	U	F	Y	V	W	Ϡ
,A	,B	,G	,D	,E	,C	,Z	,H	,J

Our routines generate the same outcomes as the standard routine IntegerString as above.

```
{ToGREEKN[101], ToGreekN[1101], ToLATINN[101], ToLatinN[1101]}
```

{PA´, ,αρα´, RA´, ,ara´}

We can transcribe letter by letter using the order of the numerical-alphabet.

```
TranscribeN["Zeus", "ToGreek"]
```

Ζευσ

```
TranscribeN["Zeuc", "ToGreek"]
```

Ζευς

The following is a transpose of the combinations.

```
$GreekN + ($GreekN // TUC) + $LatinN + ($LatinN // TUC) /. Plus → "";
```

```
Riffle[%, $NumberN] // Transpose // TableForm
```

(a, A, α, A)	1	(i, I, ι, I)	10	(r, R, ρ, P)	100	(ʼa, ʼA, ʼα, ʼA)	1000
(b, B, β, B)	2	(k, K, κ, K)	20	(s, S, σ, Σ)	200	(ʼb, ʼB, ʼβ, ʼB)	2000
(g, G, γ, Γ)	3	(l, L, λ, Λ)	30	(t, T, τ, T)	300	(ʼg, ʼG, ʼγ, ʼΓ)	3000
(d, D, δ, Δ)	4	(m, M, μ, M)	40	(u, U, υ, Υ)	400	(ʼd, ʼD, ʼδ, ʼΔ)	4000
(e, E, ϵ, E)	5	(n, N, ν, N)	50	(f, F, ϕ, Φ)	500	(ʼe, ʼE, ʼϵ, ʼE)	5000
(c, C, ς, ζ)	6	(x, X, ξ, Ξ)	60	(y, Y, χ, X)	600	(ʼc, ʼC, ʼς, ʼζ)	6000
(z, Z, ζ, Z)	7	(o, O, ο, O)	70	(v, V, ψ, Ψ)	700	(ʼz, ʼZ, ʼζ, ʼZ)	7000
(h, H, η, H)	8	(p, P, π, Π)	80	(w, W, ω, Ω)	800	(ʼh, ʼH, ʼη, ʼH)	8000
(j, J, θ, Θ)	9	(q, Q, ϙ, Ϙ)	90	(2ϑ, 2ϴ)	900	(ʼj, ʼJ, ʼθ, ʼΘ)	9000

Word value

The notion of a “word value” of Ζευς is different from the inverse problem of translating a Greek numeral into an Arabic numeral. The word value would be Ζ’ + ϵ’ + υ’ + ς’ = 7 + 5 + 400 + 6 = 418 = ΥΙΗ΄. Since it is tedious to type in the Greek letters, let us use Latin letters.

```
z = TranscribeN["Zeuc", "ToGreek"]
```

Ζευς

```
WordValueN[z, "Greek"]
```

418

The following recovers the values of the separate letters.

```
WordValueN[]
```

{7, 5, 400, 6}

The number 418 is written in Greek using the following notation.

```
IntegerString[%%, "Greek"]
```

ΥΙΗ΄

```
GreekToArabicN["ΥΙΗ΄"]
```

418

We could also have found the word value in a notation with Latin letters.

```
WordValueN["Zeuc", "Latin"]
```

418

The use of Latin letters, as shortcut for Greek, of course differs from the use of Roman numerals.

```
IntegerString[%, "Roman"]
```

CDXVIII

The discussion that inspired this notebook

Carotta (2022) traced a coin of Mark Antony and Cleopatra, who in 36-33 BC had joined forces and who had started to live together as Queen of Egypt and her spouse or Queen-consort. Their opponent was Octavian, the adopted son of Gaius Julius Caesar. Caesar had been assassinated on the Ides of March 44 BC, and Octavian wished to become his successor, and indeed later became emperor Augustus. He reminded the world that Mark Antony still was married officially to Octavia Minor, Octavian's elder sister. Earlier, Cleopatra had been with Caesar, with a son Caesarion. For Octavian, it might have been useful to have a legal reason to depose of Mark Antony, Cleopatra and Caesarion, as he eventually achieved. In the propaganda, the term of whore of Babylon may have come up, in all likelihood in reference to the old testament, Ezekiel 23:2, 18 & 28: "Son of man, there were two women, the daughters of one mother: And they committed whoredoms in Egypt; they committed whoredoms in their youth: there were their breasts pressed, and there they bruised the teats of their virginity. (...) And the Babylonians came to her into the bed of love, and they defiled her with their whoredom, and she was polluted with them, and her mind was alienated from them. (...)Thus will I make thy lewdness to cease from thee, and thy whoredom brought from the land of Egypt: so that thou shalt not lift up thine eyes unto them, nor remember Egypt any more. " (King James)

Abb. 2. Tetradrachme von Kleopatra und Antonius, 36–33 v. Chr.
Legende:
ΒΑCΙΛΙCCΑ ΚΛΕΟΠΑΤΡΑ ΘΕΑ ΝΕΩΤΕΡΑ, «Königin Kleopatra Neuere Göttin».
ΑΝΤΩΝΙΟC ΑΥΤΟΚΡΑΤΩΡ ΤΡΙΤΟΝ ΤΡΙΩΝ ΑΝΔΡΩΝ, «Antonius Imperator zum dritten Mal Triumvir».

Carotta links Octavian to the notion of "son (of Caesar), youth", Latin *iuvenis,* which could become Greek *ioannis,* which links up to the name of John, the ascribed writer of the Revelations and the Apocalypse. The gospel could be read and might have been created as a paraphrase of what might have been Octavian's proclamation of investiture, in which he, or a writer for him, reveals ("unveals",

“away from hiding”, *ἀποκάλυψις*) his plans and deeds at the beginning of his road to power. Revelation 13: 17 & 18 has: “And that no man might buy or sell, save he that had the mark, or the name of the beast, or the number of his name. Here is wisdom. Let him that hath understanding count the number of the beast: for it is the number of a man; and his number is Six hundred threescore and six.” (King James).

Supposedly "man" might also be "person". Carotta suggests that "beast" is better translated as "horrible person" or something to that effect. Octavian abhorred that Mark Antony and Cleopatra issued their own coins, so that trade in the Eastern Roman empire could be conducted with those coins rather than with the coins issued by Rome. Coins came not only with seigniorage but also with propaganda value for a population and notably soldiers with little competence in reading. Subsequently, Carotta takes the name of Cleopatra and the abbreviation of her title, the "newer goddess". (Apparently it had to be "newer" since an earlier Cleopatra Thea c. 164 – 121 BC already had been a "new goddess".)

Subsequently, using ΚΛΕΟΠΑΤΡΑ Θ(*εα*) Ν(*εωτερα*) and not counting spaces.

```
WordValueN["ΚΛΕΟΠΑΤΡΑ Θ Ν", "Greek"]
```

666

```
WordValueN[]
```

{20, 30, 5, 70, 80, 1, 300, 100, 1, 9, 50}

As stated above, the Greek numeral would be:

```
IntegerString[666, "Greek"] // $WauToStigma
```

ΧΞϚ΄

```
ToGreekN[666]
```

χξϛ΄

Carotta mentions that some methods allow to count a letter only once. In that case one of the two A’s would drop out, and the word value would become 665. He refers to some manuscripts with versions of the gospel where 665 indeed is mentioned rather than 666.

It is a remarkable analysis, also given the wide variety of non-conclusive results by so many authors in history. The reader is referred to Carotta’s text. For some readers it will be unfortunate that the current text is in German.

Colignatus (2022) has a discussion of Carotta's use of "cryptic word puzzle techniques", a bit more radical than midrashim, for decoding new testament texts, like e.g. *iuvennus* (Latin, for a property) ~ *ιοαννις* (Greek, for a personal name).

PM 1. Carotta (2005) gives the underlying theory. Carotta makes the reception of his analysis vulnerable by his phrase “Jesus was Caesar” (the title of his English book). With IC = Iulius Caesar (Latin had no J) and IX = I*ησούς* X*ριστός* (early written sources were in Greek), Carotta’s statement is IX = IC. Commonly, people will understand that the historical person IC will have had many properties that differ from the properties attributed to IX, thus IX ≠ IC. The latter inequality holds whether IX was a historical figure or not, but anyhow when one considers IX with the usual properties attributed to him. What

Carotta means to say is that IC > IX, or "Jesus was modeled on Caesar", or that the life of IC (100 - 44 BC) and the Divus Iulius cult after Caesar's deification apparently were used to create the religion that is centered around IX (supposedly born in 0 AD but commonly dated to circa 4 BC - 30 or 33 AD).

(It is one of Carotta's suggestions that Eusebius (c 260/265 - 339 AD) in his *Pantodape historia* ("The Chronicon") intended that IX was born on 0 AD, but that he was more fundamentally stuck on the notion that IC was born on a round number year, and then chose the latter as 100 BC so that IX could be at 0 AD. With the Gregorian calendar fixed, historians later arrived at a supposed birth of IX around 4 BC.)

PM 2. Engineer Arne Eickenberg (2015) gives the analysis that natural events, that supposedly occurred around the death of IX, actually were observed around the death of IC. Well known is Caesar's Comet or the Sidus Iulium of July 44 BC. Such events would have been mentioned in the Divus Iulius cult, and could have been transcribed towards other religious texts without checking upon actual dates.

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