

Greek characters supported by *greek-fontenc*

Günter Milde

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Abstract

This document lists all Greek characters that are supported by *greek-fontenc*. It also tests the outcome of \MakeUppercase and \MakeLowercase for different input variants (literal input, LICR¹ macro, Latin transliteration).

The document is compiled with LuaLaTeX, format version 2023-06-01 patch-level 1, and the L3 programming layer from 2023-08-11.

The *babel-greek* version is “2023/06/23 1.13.3 Greek support for the babel system”.

The \greekfontencoding is TU and the current language variant is *polutoniko*.

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1 Input Variants

The columns represent the following input variants:

1. literal character
2. named accent macro + LICR
3. short accent macro + LICR
4. short accent macro + literal character
5. short accent macro (reversed order) + literal character

For composite diacritics, there are additional columns for short macros in reversed order and with the second diacritic as accent macro.

¹LaTeX internal character representation

2 Greek and Coptic

Characters from the Greek and Coptic Unicode block that are supported by *greek-fontenc* and *greek-inputenc*:

x0374	''	''	''
x0375	''	''	''
x037A	''''''	''''''	''''''
0x37E	;;;;;	;;;;;	;;;;;
x0384	''''''	''''''	''''''
x0385
x0386	Α Α Α Α	Α Α Α Α	ά á á á
x0387
x0388	Έ Έ Έ Ε	Ε Ε Ε Ε	έ é é é
x0389	Ή Ή Ή Η	Ή Η Η Η	ή ή ή ή
x038A	Τ Τ Ι Ι	Ι Ι Ι Ι	ί ί ί ί
x038C	Ο Ο Ο Ο	Ο Ο Ο Ο	ό ó ó ó
x038E	Υ Υ Υ Υ	Υ Υ Υ Υ	ύ ú ú ú
x038F	Ω Ω Ω Ω	Ω Ω Ω Ω	ώ ó ó ó
x0390	Ϊ Η Η Η Η	Ϊ Η Η Η Η	Ϊ Η Η Η Η
x0391	Α Α Α Α	Α Α Α Α	α α α α
x0392	Β Β Β Β	Β Β Β Β	β β β β
x0393	Γ Γ Γ Γ	Γ Γ Γ Γ	γ γ γ γ
x0394	Δ Δ Δ Δ	Δ Δ Δ Δ	δ δ δ δ
x0395	Ε Ε Ε Ε	Ε Ε Ε Ε	ε ε ε ε
x0396	Ζ Ζ Ζ Ζ	Ζ Ζ Ζ Ζ	ζ ζ ζ ζ
x0397	Η Η Η Η	Η Η Η Η	η η η η
x0398	Θ Θ Θ Θ	Θ Θ Θ Θ	θ θ θ θ
x0399	Ι Ι Ι Ι	Ι Ι Ι Ι	ι ι ι ι
x039A	Κ Κ Κ Κ	Κ Κ Κ Κ	κ κ κ κ
x039B	Λ Λ Λ Λ	Λ Λ Λ Λ	λ λ λ λ
x039C	Μ Μ Μ Μ	Μ Μ Μ Μ	μ μ μ μ
x039D	Ν Ν Ν Ν	Ν Ν Ν Ν	ν ν ν ν
x039E	Ξ Ξ Ξ Ξ	Ξ Ξ Ξ Ξ	ξ ξ ξ ξ
x039F	Ο Ο Ο Ο	Ο Ο Ο Ο	ο ο ο ο
0x3A0	Π Π Π Π	Π Π Π Π	π π π π
0x3A1	Ρ Ρ Ρ Ρ	Ρ Ρ Ρ Ρ	ρ ρ ρ ρ
0x3A3	Σ Σ Σ Σ	Σ Σ Σ Σ	ς σ σ σ
0x3A4	Τ Τ Τ Τ	Τ Τ Τ Τ	τ τ τ τ
0x3A5	Υ Υ Υ Υ	Υ Υ Υ Υ	υ υ υ υ
0x3A6	Φ Φ Φ Φ	Φ Φ Φ Φ	φ φ φ φ
0x3A7	Χ Χ Χ Χ	Χ Χ Χ Χ	χ χ χ χ
0x3A8	Ψ Ψ Ψ Ψ	Ψ Ψ Ψ Ψ	ψ ψ ψ ψ
0x3A9	Ω Ω Ω Ω	Ω Ω Ω Ω	ω ω ω ω
0x3AA	Ϊ Η Η Η	Ϊ Η Η Η	Ϊ Η Η Η
0x3AB	΂ Υ Υ Υ	΂ Υ Υ Υ	΂ υ υ υ
0x3AC	ά á á á	Α Α Α Α	ά á á á
0x3AD	έ é é é	Ε Ε Ε Ε	έ é é é
0x3AE	ή ή ή ή	Ή Η Η Η	ή ή ή ή
0x3AF	ί ί ί ί	Ι Ι Ι Ι	ί ί ί ί

x03B0	შ უ შ უ შ უ	ჴ ჴ ჴ თ თ თ	უ უ შ უ შ უ
x03B1	ა ა ა ა	ა ა ა ა	ა ა ა ა
x03B2	ბ ბ ბ ბ	ბ ბ ბ ბ	ბ ბ ბ ბ
x03B3	გ გ გ გ	გ გ გ გ	გ გ გ გ
x03B4	დ დ დ დ	დ დ დ დ	დ დ დ დ
x03B5	ე ე ე ე	ე ე ე ე	ე ე ე ე
x03B6	ც ც ც ც	ზ ზ ზ ზ	ც ც ც ც
x03B7	η η η η	ც ც ც ც	η η η η
x03B8	θ θ θ θ	თ თ თ თ	θ θ θ θ
x03B9	თ თ თ თ	თ თ თ თ	თ თ თ თ
x03BA	კ კ კ კ	კ კ კ კ	კ კ კ კ
x03BB	λ ლ ლ ლ	ლ ლ ლ ლ	ლ ლ ლ ლ
x03BC	μ მ მ მ	მ მ მ მ	μ მ მ მ
x03BD	ν ვ ვ ვ	ნ ნ ნ ნ	ν ვ ვ ვ
x03BE	ξ ხ ხ ხ	Ξ Ξ Ξ Ξ	ξ ხ ხ ხ
x03BF	օ օ օ օ	Օ Օ Օ Օ	օ օ օ օ
x03C0	π π π π	Π Π Π Π	π π π π
x03C1	ρ ρ ρ ρ	Ρ Ρ Ρ Ρ	ρ ρ ρ ρ
x03C2	ς ც ც ც	Σ Σ Σ Σ	ც ც ც ც
x03C3	σ σ σ σ	Σ Σ Σ Σ	σ σ σ σ
x03C4	τ τ τ τ	Τ Τ Τ Τ	τ τ τ τ
x03C5	υ υ υ υ	Υ Υ Υ Υ	υ υ υ υ
x03C6	φ φ φ φ	Φ Φ Φ Φ	φ φ φ φ
x03C7	χ χ χ χ	Χ Χ Χ Χ	χ χ χ χ
x03C8	ψ ψ ψ ψ	Ψ Ψ Ψ Ψ	ψ ψ ψ ψ
x03C9	ω ω ω ω	Ω Ω Ω Ω	ω ω ω ω
x03CA	წ წ წ წ	Ϊ Ϊ Ϊ Ϊ	წ წ წ წ
x03CB	შ შ შ შ	ჴ ჴ ჴ ჴ	შ შ შ შ
x03CC	օ օ օ օ	Օ Օ Օ Օ	օ օ օ օ
x03CD	უ უ უ უ	Υ Υ Υ Υ	უ უ უ უ
x03CE	ώ ώ ώ ώ	Ω Ω Ω Ω	ώ ώ ώ ώ
x03D0	ნ ն	Բ Բ	ն ն
x03D1	թ թ	Θ Θ	թ թ
x03D5	Փ Փ	Փ Փ	Փ Փ
x03D6	Թ Թ	Π Π	Թ Թ
x03D8	Պ Պ	Պ Պ	Պ Պ
x03D9	Ջ Ջ	Պ Պ	Ջ Ջ
x03DA	Չ Չ	Չ Չ	Չ Չ
x03DB	Հ Հ	Չ Չ	Հ Հ
x03DC	Ֆ Ֆ	Ֆ Ֆ	Ֆ Ֆ
x03DD	Ռ Ռ	Ֆ Ֆ	Ռ Ռ
x03DE	Ւ Ւ	Ւ Ւ	Ւ Ւ
x03DF	Ն Ն	Ւ Ւ	Ն Ն
x03E0	Ա Ա	Ա Ա	Ա Ա
x03E1	Հ Հ	Ա Ա	Հ Հ
x03F0	Կ Կ	Կ Կ	Կ Կ
x03F1	Պ Պ	Պ Պ	Պ Պ
x03F4	Թ Թ	Թ Թ	Թ Թ
x03F5	Է Է	Է Է	Է Է

3 Greek extended

x1F00	à à à à	A A A A	à à à à
x1F01	á á á á	A A A A	á á á á
x1F02	ã ã ã ã	A A A A A A	ã ã ã ã ã ã
x1F03	â â â â	A A A A A A	â â â â ã ã
x1F04	ă ă ă ă	A A A A A A	ă ă ă ă ă ă
x1F05	ă ă ă ă ă ă	A A A A A A	ă ă ă ă ă ă
x1F06	ă ă ă ă ă ă	A A A A A A	ă ă ă ă ă ă
x1F07	ă ă ă ă ă ă	A A A A A A	ă ă ă ă ă ă
x1F08	’A ’A ’A	A A A A	à à à à
x1F09	’A ’A ’A	A A A A	á á á á
x1F0A	’A ’A ’A ’A ’A	A A A A A A	ã ã ã ã ã ã
x1F0B	’A ’A ’A ’A ’A	A A A A A A	â â â â ã ã
x1F0C	’A ’A ’A ’A ’A	A A A A A A	ă ă ă ă ă ă
x1F0D	’A ’A ’A ’A ’A	A A A A A A	ă ă ă ă ă ă
x1F0E	’A ’A ’A ’A ’A	A A A A A A	ă ă ă ă ă ă
x1F0F	’A ’A ’A ’A ’A	A A A A A A	ă ă ă ă ă ă
x1F10	è è è è	E E E E	è è è è
x1F11	é è è è	E E E E	é è è è
x1F12	ë è è è è è è	E E E E E E	ë è è è è è è
x1F13	ë è è è è è è	E E E E E E	ë è è è è è è
x1F14	ë è è è è è è	E E E E E E	ë è è è è è è
x1F15	ë è è è è è è	E E E E E E	ë è è è è è è
x1F18	’E ’E ’E E	E E E E	è è è è
x1F19	’E ’E ’E E	E E E E	é è è è
x1F1A	”E ”E ”E E E E	E E E E E E	ë è è è è è è
x1F1B	”E ”E ”E E E E	E E E E E E	ë è è è è è è
x1F1C	”E ”E ”E E E E	E E E E E E	ë è è è è è è
x1F1D	”E ”E ”E E E E	E E E E E E	ë è è è è è è
x1F20	ń ń ń ń	H H H H	ń ń ń ń
x1F21	ń ń ń ń	H H H H	ń ń ń ń
x1F22	ń ń ń ń ń ń ń	H H H H H H H	ń ń ń ń ń ń ń
x1F23	ń ń ń ń ń ń ń	H H H H H H H	ń ń ń ń ń ń ń
x1F24	ń ń ń ń ń ń ń	H H H H H H H	ń ń ń ń ń ń ń
x1F25	ń ń ń ń ń ń ń	H H H H H H H	ń ń ń ń ń ń ń
x1F26	ń ń ń ń ń ń ń	H H H H H H H	ń ń ń ń ń ń ń
x1F27	ń ń ń ń ń ń ń	H H H H H H H	ń ń ń ń ń ń ń
x1F28	’H ’H ’H H	H H H H	ń ń ń ń
x1F29	’H ’H ’H H	H H H H	ń ń ń ń
x1F2A	”H ”H ”H H H H H	H H H H H H H	ń ń ń ń ń ń ń
x1F2B	”H ”H ”H H H H H	H H H H H H H	ń ń ń ń ń ń ń
x1F2C	”H ”H ”H H H H H	H H H H H H H	ń ń ń ń ń ń ń
x1F2D	”H ”H ”H H H H H	H H H H H H H	ń ń ń ń ń ń ń
x1F2E	”H ”H ”H H H H H	H H H H H H H	ń ń ń ń ń ń ń
x1F2F	”H ”H ”H H H H H	H H H H H H H	ń ń ń ń ń ń ń
x1F30	í í í í	I I I I	í í í í
x1F31	í í í í	I I I I	í í í í
x1F32	í í í í í í	I I I I I I	í í í í í í
x1F33	í í í í í í	I I I I I I	í í í í í í

x1F34	々々々々	IIII	々々々々
x1F35	々々々々	IIII	々々々々
x1F36	々々々々	IIII	々々々々
x1F37	々々々々	IIII	々々々々
x1F38	々々々々	IIII	々々々々
x1F39	々々々々	IIII	々々々々
x1F3A	々々々々	IIII	々々々々
x1F3B	々々々々	IIII	々々々々
x1F3C	々々々々	IIII	々々々々
x1F3D	々々々々	IIII	々々々々
x1F3E	々々々々	IIII	々々々々
x1F3F	々々々々	IIII	々々々々
x1F40	ゞゞゞゞ	OOOO	ゞゞゞゞ
x1F41	ゞゞゞゞ	OOOO	ゞゞゞゞ
x1F42	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F43	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F44	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F45	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F48	ゞゞゞゞ	OOOO	ゞゞゞゞ
x1F49	ゞゞゞゞ	OOOO	ゞゞゞゞ
x1F4A	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F4B	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F4C	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F4D	ゞゞゞゞ	OOOOO	ゞゞゞゞ
x1F50	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F51	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F52	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F53	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F54	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F55	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F56	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F57	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F59	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F5B	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F5D	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F5F	ゞゞゞゞ	YYYY	ゞゞゞゞ
x1F60	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F61	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F62	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F63	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F64	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F65	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F66	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F67	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F68	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F69	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F6A	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F6B	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F6C	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F6D	ゞゞゞゞ	QQQQ	ゞゞゞゞ
x1F6E	ゞゞゞゞ	QQQQ	ゞゞゞゞ

x1F6F	ꝝ ꝗ Ꝙ ꝙ ꝛ	ꝝ ꝗ Ꝙ ꝙ ꝛ	ꝝ ꝗ Ꝙ ꝙ ꝛ
x1F70	à à à à	A A A A	à à à à
x1F71	á á á á	A A A A	á á á á
x1F72	è è è è	E E E E	è è è è
x1F73	é é é é	E E E E	é é é é
x1F74	ѝ ѝ ѝ ѝ	H H H H	ѝ ѝ ѝ ѝ
x1F75	ń ń ń ń	H H H H	ń ń ń ń
x1F76	ı ı ı ı	III I	ı ı ı ı
x1F77	ı ı ı ı	III I	ı ı ı ı
x1F78	ò ò ò ò	O O O O	ò ò ò ò
x1F79	ó ó ó ó	O O O O	ó ó ó ó
x1F7A	ὺ ὺ ὺ ὺ	Y Y Y Y	ὺ ὺ ὺ ὺ
x1F7B	ú ú ú ú	Y Y Y Y	ú ú ú ú
x1F7C	ѡ ѡ ѡ ѡ	Ω Ω Ω Ω	ѡ ѡ ѡ ѡ
x1F7D	ó ó ó ó	Ω Ω Ω Ω	ó ó ó ó
x1F80	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F81	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F82	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F83	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F84	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F85	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F86	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F87	ą ą ą ą	A. A. A. A.	ą ą ą ą
x1F88	À À À À	A. A. A. A.	à à à à
x1F89	À À À À	A. A. A. A.	à à à à
x1F8A	À À À À	A. A. A. A.	à à à à
x1F8B	À À À À	A. A. A. A.	à à à à
x1F8C	À À À À	A. A. A. A.	à à à à
x1F8D	À À À À	A. A. A. A.	à à à à
x1F8E	À À À À	A. A. A. A.	à à à à
x1F8F	À À À À	A. A. A. A.	à à à à
x1F90	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F91	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F92	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F93	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F94	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F95	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F96	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F97	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F98	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F99	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F9A	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F9B	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F9C	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F9D	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F9E	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1F9F	᷇ ᷇ ᷇ ᷇	H. H. H. H.	᷇ ᷇ ᷇ ᷇
x1FA0	ᷔ ᷔ ᷔ ᷔ	Ω. Ω. Ω. Ω.	ᷔ ᷔ ᷔ ᷔ
x1FA1	ᷔ ᷔ ᷔ ᷔ	Ω. Ω. Ω. Ω.	ᷔ ᷔ ᷔ ᷔ
x1FA2	ᷔ ᷔ ᷔ ᷔ	Ω. Ω. Ω. Ω.	ᷔ ᷔ ᷔ ᷔ

x1FA3	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FA4	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FA5	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FA6	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FA7	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FA8	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FA9	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FAA	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FAB	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FAC	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FAD	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FAE	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FAF	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ	Ӯ Ӯ Ӯ Ӯ
x1FB0	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB1	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB2	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB3	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB4	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB6	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB7	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB8	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FB9	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FBA	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FBB	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FBC	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ	Ӑ Ӑ Ӑ Ӑ
x1FBD	,	,	,
x1FBE	Ӗ Ӗ Ӗ Ӗ	Ӗ Ӗ Ӗ Ӗ	Ӗ Ӗ Ӗ Ӗ
x1FBF	,	,	,
x1FC0	~ ~ ~ ~	~ ~ ~	~ ~ ~
x1FC1	~ ~ ~ ~	~	~ ~ ~ ~
x1FC2	Ҥ Ҥ Ҥ Ҥ	Ҥ Ҥ Ҥ Ҥ	Ҥ Ҥ Ҥ Ҥ
x1FC3	Ҥ Ҥ Ҥ Ҥ	Ҥ Ҥ Ҥ Ҥ	Ҥ Ҥ Ҥ Ҥ
x1FC4	Ҥ Ҥ Ҥ Ҥ	Ҥ Ҥ Ҥ Ҥ	Ҥ Ҥ Ҥ Ҥ
x1FC6	Ҥ Ҥ Ҥ Ҥ	H H H	Ҥ Ҥ Ҥ Ҥ
x1FC7	Ҥ Ҥ Ҥ Ҥ	H H H	Ҥ Ҥ Ҥ Ҥ
x1FC8	'E 'E 'E E	E E E E	Ѐ ܰ ܰ ܰ
x1FC9	'E 'E 'E E	E E E E	ܰ ܰ ܰ ܰ
x1FCA	'H 'H 'H H	H H H H	ܰ ܰ ܰ ܰ
x1FCB	'H 'H 'H H	H H H H	ܰ ܰ ܰ ܰ
x1FCC	H H H H	H H H H	ܰ ܰ ܰ ܰ
x1FCD	~ ~ ~ ~	~	~ ~ ~ ~
x1FCE	~ ~ ~ ~	~	~ ~ ~ ~
x1FCF	~ ~ ~ ~	~	~ ~ ~ ~
x1FD0	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ
x1FD1	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ
x1FD2	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ
x1FD3	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ
x1FD6	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ
x1FD7	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ Ӣ Ӣ
x1FD8	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ
x1FD9	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ	Ӣ Ӣ Ӣ Ӣ

x1FDA			
x1FDB	TTTII	TTTII	TTTII
x1FDD	„ „ „ „ „	„	„ „ „ „ „
x1FDE	„ „ „ „ „	„	„ „ „ „ „
x1FDF	„ „ „ „ „	„	„ „ „ „ „
x1FE0	ෂ ඉ ඉ ඉ	ෂ ඉ ඉ ඉ	ෂ ඉ ඉ ඉ
x1FE1	ං ඉ ඉ ඉ	ං ඉ ඉ ඉ	ං ඉ ඉ ඉ
x1FE2	ං ඉ ඉ ඉ ඉ ඉ	ං ඉ ඉ ඉ ඉ ඉ	ං ඉ ඉ ඉ ඉ ඉ
x1FE3	ං ඉ ඉ ඉ ඉ ඉ	ං ඉ ඉ ඉ ඉ ඉ	ං ඉ ඉ ඉ ඉ ඉ
x1FE4	ං ඉ ඉ ඉ ඉ	P P P P	ං ඉ ඉ ඉ ඉ
x1FE5	ං ඉ ඉ ඉ ඉ	P P P P	ං ඉ ඉ ඉ ඉ
x1FE6	ං ඉ ඉ ඉ	Y Y Y Y	ං ඉ ඉ ඉ
x1FE7	ං ඉ ඉ ඉ ඉ ඉ ඉ	ං ඉ ඉ ඉ ඉ ඉ	ං ඉ ඉ ඉ ඉ ඉ
x1FE8	ං ඉ ඉ ඉ	ං ඉ ඉ ඉ	ං ඉ ඉ ඉ
x1FE9	ං ඉ ඉ ඉ	ං ඉ ඉ ඉ	ං ඉ ඉ ඉ
x1FEA	Y Y Y Y	Y Y Y Y	Y Y Y Y
x1FEB	Y Y Y Y	Y Y Y Y	Y Y Y Y
x1FEC	P P P P	P P P P	ං ඉ ඉ ඉ ඉ
x1FED	„ „ „ „ „	„ „ „ „ „	ං ඉ ඉ ඉ ඉ
x1FEE	„ „ „ „ „	„ „ „ „ „	ං ඉ ඉ ඉ ඉ
x1FEF	„ „ „ „	„ „ „ „	ං ඉ ඉ ඉ
x1FE3	අ අ අ අ	Ω Ω Ω Ω	අ අ අ අ
x1FE4	අ අ අ අ	Ω Ω Ω Ω	අ අ අ අ
x1FE5	අ අ අ අ	Ω Ω Ω Ω	අ අ අ අ
x1FE6	අ අ අ	Ω Ω Ω Ω	අ අ අ
x1FE7	අ අ අ අ	Ω Ω Ω Ω	අ අ අ අ
x1FE8	’ ’ ’ ’	○ ○ ○ ○	’ ’ ’ ’
x1FE9	’ ’ ’ ’	○ ○ ○ ○	’ ’ ’ ’
x1FEA	Ω Ω Ω Ω	Ω Ω Ω Ω	ω ω ω ω
x1FEB	Ω Ω Ω Ω	Ω Ω Ω Ω	ω ω ω ω
x1FEC	Ω Ω Ω Ω	Ω Ω Ω Ω	ω ω ω ω
x1FED	„ „ „ „	„ „ „ „	„ „ „ „
x1FEE	„ „ „ „	„	„ „ „ „

4 Discussion

4.1 Differences between literal input and LICRs

Under pdfTeX and XeTeX, all input variants select pre-composed characters if possible (**Unicode normalization NFC**). Under luatex, accent macros on a literal character are printed using combining diacritical marks. This leads to suboptimal placement of diacritics with many fonts, often resulting in illegible output.

4.1.1 Upcasing

Up to 2022, diacritics were dropped from Greek letters in `UPPERCASE` in any locale. The new `\MakeUppercase` implementation follows the Unicode standard, where dropping diacritics is a feature of the Greek locale (“el”).

However, “named” accent macros with Greek names behave according to Greek typesetting rules in *all* locales. The current implementation also drops diacritics input via standard accent macros in documents that declare the Greek language with Babel.

Apart from the diacritical marks native to Greek itself, linguists also regularly mark vowel length with macrons (̄) and breves (̄). The length markers are used in dictionaries and textbooks but not part of the Greek orthography. There is no established praxis regarding their handling in uppercase. LaTeX keeps them but the Unicode reference implementation drops them.

Greek stand-alone diacritics are dropped by `\MakeUppercase` if input via accent macros (e.g. `\accdialytika` or `\">'>`).

4.1.2 Sigma, final sigma, and “autosigma”

There are two variants of the lower case letter *sigma*.

The lowercasing Σ should select a final sigma at the end of a word: $\Sigma\Sigma \mapsto \sigma\zeta$.

Since 2022, `\MakeLowercase` selects the correct sigma variant for a literal Sigma under Xe/LuaTeX, too.

The `\textSigma` macro is mapped to `\textautosigma` which under 8-bit TeX prints the sigma variant according to its position but, unfortunately, fails with Unicode fonts: $\Sigma \rightarrow \sigma\sigma$.

In LGR, you can add a ZWNJ or use the \noboundary macro to prevent the conversion to a final sigma: σ\x.

4.1.3 The one-letter word $\vec{\eta}$ (or)

For disambiguation, the Greek word *or* (ἢ / ὢ) keeps diacritics in UPPERCASE:

$$\text{H}_2\text{H}_2 \rightarrow \text{H}_2\text{H}_2\text{H}_2\text{H}_2$$

However, eta drops diacritics if it is part of a word: ήτοι, Ἡτοι, επιταγή ήτοι, Ἡτοι → ΗΤΟΙ, ΉΤΟΙ, ΕΠΙΤΑΓΗ ΉΤΟΙ, ΉΤΟΙ.³

TODO: The 2022 MakeUppercase handles this for literal input. Currently, this feature is not supported with other input methods.

4.2 Case conversion if the locale is *not* Greek

In order to fix upcasing for Greek, babel-greek maps standard accent macros to “capital” versions.⁴ The default expansion ensures that accents are kept on Latin letters: á à ã ä → Á À Ã Ä.⁵

Some characters from the “Greek and Coptic” and “Greek extended” Unicode blocks have no pre-composed uppercase equivalent. Since 2022, upcasing them led to compiling errors under pdfLaTeX. This is fixed in the 2023 LaTeX release by mapping the affected characters to macro representations before case conversions: with pdfLaTeX, diacritics are dropped from literal characters without pre-composed uppercase equivalent also if the text language is *not* Greek, with Xe/LuaTeX, combining characters are used (and may overlap with the base letter).

ይህ ስምም አገኝ በዚህ የዚህ መሆኑ → የጥጥለያን ጥርዝር የጥጥለያን ደንብ

4.3 Symbol variants

Several Greek letters have alternative representations which may have a different semantic in a mathematical context. Unicode reserves code points for the alternative

²TODO: The polytonic variant with dasia and oxia used in ḥ ... ḥ (*either ... or*) drops diacritics! By mistake, omission, or intent?

³TODO: It seems the test is only for whitespace on both sides: η , 'H. η ; "H → H, H. H; H

⁴In case of problems, these mappings can be disabled with the `local-MakeUppercase-fixes` language modifier.

⁵If the Language is set to Greek, this works unless the font encoding is 8-bit LGR (where Latin letters are interpreted as Latin transliteration anyway): ú ù ü ú → Ú Ù Ü Ú Ú.

representations (naming them “symbol” as opposed to “letter”). Some of these symbols are available as `\var<name>` macros in TeX’s mathematical mode.

In text, they are considered typographical variants without special meaning. The 8-bit LGR font encoding does not allocate code points for them. *Babel-greek* and the *textalpha* package provide the `normalize-symbols` option (ignored with Xe/LuaTeX) that is also used in this test document.

Test the handling of symbol variants in text

literal letter, LICR, `\var<name>`, `\<name>symbol`, literal symbol:

No case change

ββδδδ εεεεε θθθθθ ΘΘΘΘΘ κκκκκ πππππ ρρρρρ φφφφφ

MakeUppercase selects the matching capital letter:

BBBBB EEEEE ΘΘΘΘΘ ΘΘΘΘΘ KKKKK ΠΠΠΠΠ PPPPΦ ΦΦΦΦΦ

MakeLowercase selects the lowercase letter (not the symbol):

ββ εε θθ θθθ κκ ππ ρρ φφ.

LGR provides two lowercase variants of the archaic letter *stigma*. Both map to GREEK LETTER STIGMA Σ.

The lowercase of Σ is `ς` (`\textstigma`), not `\textvarstigma`.

4.4 Hiatus

Tonos and psili mark a *hiatus* (break-up) if placed on the first of two vowels that would otherwise form a diphthong. A dialytika must be placed on the second vowel if they are dropped:

άι áν éι āν ēι ḷν → AΪ AΪ EΪ AΪ AΪ EΪ AΪ (literal)

άι áν éι āν ēι ḷν → AΪ AΪ EΪ AΪ AΪ EΪ AΪ (named+LICR)

άι áν éι āν ēι ḷν → AΪ AΪ EΪ AΪ AΪ EΪ AΪ (short+LICR)

άι áν éι ḷι ḷν ēι ḷν → AΪ AΫ EΪ AΪ AΫ EΪ AΫ (short+literal)

ἀι ḷν ēι ḷι ḷν ēι → AΪ AΫ EΪ AΪ AΫ EΪ (short+literal, reversed)

The “hiatus feature” does not work with the LGR “input ligatures”. Support for monotonic literal characters came with the 2022 `\MakeUppercase` implementation changes. Since 2023 it also works with polytonic literals (ἀυπνία → ΑΫΠΝΙΑ).