The eulerpx font package

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Getting started

You can start using eulerpx in your document right away by adding

```
\usepackage{newpxtext}
\usepackage{eulerpx}
```

to your document preamble. Euler Fraktur can be accessed through the `\mathfrak`-macro, likewise Euler Script through `\mathscr`. The bold math font (Euler) can be accessed through `\boldsymbol`, and the bold text font through `\mathbf`. Alternative versions of various math symbols and alphabets from newpx are provided by `\varmathfrak`, `\varmathscr`, `\varsum` and `\varaleph`.

1 Introduction

$\mathcal{AMS}$ Euler (from here on simply referred to as 'Euler') is a typeface created by Hermann Zapf (1918-2015) in 1983. Unfortunately, Zapf wasn't able to complete the font during his lifetime, meaning that many frequently-used math symbols are missing from it. In order to make Euler usable, these symbols have to be substituted from other fonts. Other LaTeX implementations of Euler, such as the euler and eulervm packages, use the default Computer Modern typeface for these substitutions.

The big issue with using Computer Modern for substituting math symbols in Euler, is that these two fonts generally don't go well together. The eulerpx package tries to alleviate this issue by allowing the user to choose different math fonts for its substitutions. The obvious and default choice for this font is the Palatino typeface, another typeface created by Zapf. This font is conveniently provided by the package newpx, and hence the name 'eulerpx.'

2 Options

In initial versions of this package, newpx was the only font option. But, since version 1.0, you can load your own math font *before* eulerpx, if you use the `nonpxmath`-option. We additionally provide the key-value option `scale` (for instance, `scale=0.9`, for a fractional scale of 0.9). This allows you to scale the Euler symbols to match the size of the symbols from the other font.

Not all font combinations are guaranteed to look good, so exercise some caution in your font choice. Additionally, you should try to stick to math fonts that include upright integrals (for instance, through an `upint`-option), and slanted versions of the inequality symbols, which are selected automatically by eulerpx, if available. If you prefer the non-slanted inequality symbols, this behaviour can be inhibited using the `noslant`-option.

*The intial versions of this package were written by Jabir Ali Ouassou.

2.1 Example

For instance, in order to use the Times typeface (package newtx) with Euler, you can add

```
\usepackage{newtxtext}
\usepackage[upint]{newtxmath}
\usepackage[nonpxmath,scale=0.95]{eulerpx}
```

to your document preamble. The scale factor of 0.95 was derived empirically by trying to match the height of the text and math 'x;' `x$x$`.

3 Deprecated options

Some of the options that were previously offered by this package are now deprecated. These options were not correctly implemented and could cause visual artifacts. If you would still like to use some of these options, alternatives that mimic their original behaviour are provided below.

3.1 The `sansmath`-option

If you want to use the sans-serif text font for operators (as opposed to the default serif text font), you can add the following to your document preamble:

```
\usepackage{newpxtext}
\let\oldrmdefault=\rmdefault
\let\rmdefault=\sfdefault
\usepackage{eulerpx}
\let\rmdefault=\oldrmdefault
```

3.2 The `unicode`-option

If you want to write mathematics in Unicode in `pdflatex`, you can add this to your document preamble:[1]

```
\usepackage{newpxtext}
\usepackage{eulerpx}
\let\rmdefault=\oldrmdefault
\def\z"{}
\def\UnicodeMathSymbol#1#2#3#4{%
  \ifnum#1>"A0
    \DeclareUnicodeCharacter{\z#1}{#2}%
  \fi
}
\input unicode-math-table
```

Though, in that case, you may also want to switch to XeLaTeX, in which case you can use the unicode-math package.

[1] Credit: David Carlisle on Stack Exchange, `https://tex.stackexchange.com/a/601583`.

A Font sample

The following excerpt is taken from Michael Sharpe's stickstoo package documentation (page 4), who in turn sourced it from the TEXBook and Karl Berry's torture test.

$x+y-z$, $x+y*z$, $z*y/z$, $(x+y)(x-y)=x^2-y^2$,
$x\times y\cdot z=[x\,y\,z]$, $x\circ y\bullet z$, $x\cup y\cap z$, $x\sqcup y\sqcap z$,
$x\vee y\wedge z$, $x\pm y\mp z$, $x=y/z$, $x:=y$, $x\leqslant y\neq z$, $x\sim y\simeq z\,x\equiv y\not\equiv z$, $x\subset y\subseteq z$
$\sin 2\theta=2\sin\theta\cos\theta$, $O(n\log n\log n)$, $\Pr(X>x)=\exp(-x/\mu)$,
$\big(x\in A(n)\,\big|\,x\in B(n)\big)$, $\bigcup_n X_n\,\|\,\bigcap_n Y_n$
In text matrices $\left(\begin{smallmatrix}1&1\\0&1\end{smallmatrix}\right)$ and $\left(\begin{smallmatrix}a&b&c\\1&m&n\end{smallmatrix}\right)$

$$a_0+\cfrac{1}{a_1+\cfrac{1}{a_2+\cfrac{1}{a_3+\cfrac{1}{a_4}}}}$$

$$\binom{p}{2}x^2y^{p-2}-\frac{1}{1-x}\frac{1}{1-x^2}=\frac{a+1}{b}\Big/\frac{c+1}{d}.$$

$$\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+x}}}}}$$

$$\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\left|\varphi(x+iy)\right|^2=0$$

$$\pi(n)=\sum_{m=2}^{n}\left\lfloor\left(\sum_{k=1}^{m-1}\left\lfloor(m/k)\Big/\lceil m/k\rceil\right\rfloor\right)^{-1}\right\rfloor.$$

$$\int_0^\infty\frac{t-ib}{t^2+b^2}e^{iat}\,dt=e^{ab}E_1(ab),\quad a,b>0.$$

$$\boldsymbol{A}:=\begin{pmatrix}x-\lambda&1&0\\0&x-\lambda&1\\0&0&x-\lambda\end{pmatrix}.$$

$$\begin{pmatrix}a&b&c\\d&e&f\end{pmatrix}\begin{pmatrix}u&x\\v&y\\w&z\end{pmatrix}$$

$$\boldsymbol{A}=\begin{pmatrix}a_{11}&a_{12}&\dots&a_{1n}\\a_{21}&a_{22}&\dots&a_{2n}\\\vdots&\vdots&\ddots&\vdots\\a_{m1}&a_{m2}&\dots&a_{mn}\end{pmatrix}$$

$$\boldsymbol{M}=\begin{array}{c}\\C\\I\\C'\end{array}\begin{array}{c}\begin{array}{ccc}C&I&C'\end{array}\\\begin{pmatrix}1&0&0\\b&1-b&0\\0&a&1-a\end{pmatrix}\end{array}$$

$$\sum_{n=0}^{\infty}a_nz^n\qquad\text{converges if}\qquad|z|<\left(\limsup_{n\to\infty}\sqrt[n]{|a_n|}\right)^{-1}.$$

$$\frac{f(x+\Delta x)-f(x)}{\Delta x} \to f'(x) \qquad \text{as } \Delta x \to 0.$$

$$\|u_i\| = 1, \qquad u_i \cdot u_j = 0 \quad \text{if } i \neq j.$$

$$\text{The confluent image of } \left\{\begin{matrix}\text{an arc}\\ \text{a circle}\\ \text{a fan}\end{matrix}\right\} \text{ is } \left\{\begin{matrix}\text{an arc}\\ \text{an arc or a circle}\\ \text{a fan or an arc}\end{matrix}\right\}.$$

$$\begin{aligned} T(n) \leqslant T(2^{\lceil \lg n \rceil}) &\leqslant c(3^{\lceil \lg n \rceil} - 2^{\lceil \lg n \rceil}) \\ &< 3c \cdot 3^{\lg n} \\ &= 3c\, n^{\lg 3}. \end{aligned}$$

$$\begin{aligned} (x+y)(x-y) &= x^2 - xy + yx - y^2 \\ &= x^2 - y^2 \\ (x+y)^2 &= x^2 + 2xy + y^2. \end{aligned}$$

$$\begin{aligned} \left(\int_{-\infty}^{\infty} e^{-x^2}\,dx\right)^2 &= \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-(x^2+y^2)}\,dx\,dy \\ &= \int_0^{2\pi}\int_0^{\infty} e^{-r^2}\,dr\,d\theta \\ &= \int_0^{2\pi}\left(e^{-\frac{r^2}{2}}\Big|_{r=0}^{r=\infty}\right)d\theta \\ &= \pi. \end{aligned}$$

$$\prod_{k\geqslant 0}\frac{1}{(1-q^k z)} = \sum_{n\geqslant 0} z^n \Big/ \prod_{1\leqslant k\leqslant n}(1-q^k).$$

$$\sum_{\substack{0<i\leqslant m\\ 0<j\leqslant n}} p(i,j) \neq \sum_{i=1}^{p}\sum_{j=1}^{q}\sum_{k=1}^{r} a_{ij}b_{jk}c_{ki} \neq \sum_{\substack{1\leqslant i\leqslant p\\ 1\leqslant j\leqslant q\\ 1\leqslant k\leqslant r}} a_{ij}b_{jk}c_{ki}$$

$$\max_{1\leqslant n\leqslant m} \log_2 P_n \quad \text{and} \quad \lim_{x\to 0}\frac{\sin x}{x} = 1$$

$$p_1(n) = \lim_{m\to\infty}\sum_{\nu=0}^{\infty}\left(1-\cos^{2m}(\nu!^n \pi/n)\right)$$

B Font tables

B.1 euf

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	
00x	𝔡 0	𝔡 1	𝔣 2	𝔣 3	𝔤 4	𝔱 5	𝔱 6	𝔲 7	″0x
01x	8	9	10	11	12	13	14	15	
02x	16	17	‘ 18	’ 19	20	21	22	23	″1x
03x	24	25	26	27	28	29	30	31	
04x	32	! 33	34	35	36	37	& 38	' 39	″2x
05x	(40	) 41	* 42	+ 43	, 44	− 45	. 46	/ 47	
06x	𝔬 48	𝔩 49	2 50	3 51	4 52	5 53	6 54	7 55	″3x
07x	8 56	9 57	: 58	; 59	60	= 61	62	? 63	
10x	64	𝔄 65	𝔅 66	ℭ 67	𝔇 68	𝔈 69	𝔉 70	𝔊 71	″4x
11x	ℌ 72	ℑ 73	𝔍 74	𝔎 75	𝔏 76	𝔐 77	𝔑 78	𝔒 79	
12x	𝔓 80	𝔔 81	ℜ 82	𝔖 83	𝔗 84	𝔘 85	𝔙 86	𝔚 87	″5x
13x	𝔛 88	𝔜 89	ℨ 90	[91	92	] 93	^ 94	95	
14x	96	𝔞 97	𝔟 98	𝔠 99	𝔡 100	𝔢 101	𝔣 102	𝔤 103	″6x
15x	𝔥 104	𝔦 105	𝔧 106	𝔨 107	𝔩 108	𝔪 109	𝔫 110	𝔬 111	
16x	𝔭 112	𝔮 113	𝔯 114	𝔰 115	𝔱 116	𝔲 117	𝔳 118	𝔴 119	″7x
17x	𝔵 120	𝔶 121	𝔷 122	123	124	" 125	126	𝔩 127	
	″8	″9	″A	″B	″C	″D	″E	″F	

B.2 zeur

	0	1	2	3	4	5	6	7	
00x	Γ0	Δ1	Θ2	Λ3	Ξ4	Π5	Σ6	Υ7	″0x
01x	Φ8	Ψ9	Ω10	α11	β12	γ13	δ14	ϵ15	
02x	ζ16	η17	θ18	ι19	κ20	λ21	μ22	ν23	″1x
03x	ξ24	π25	ρ26	σ27	τ28	υ29	ϕ30	χ31	
04x	ψ32	ω33	ε34	ϑ35	ϖ36	37	38	φ39	″2x
05x	←40	←41	→42	→43	ʿ44	ʾ45	▷46	◁47	
06x	048	149	250	351	452	553	654	755	″3x
07x	856	957	.58	,59	<60	/61	>62	⋆63	
10x	∂64	A65	B66	C67	D68	E69	F70	G71	″4x
11x	H72	I73	J74	K75	L76	M77	N78	O79	
12x	P80	Q81	R82	S83	T84	U85	V86	W87	″5x
13x	X88	Y89	Z90	♭91	♮92	♯93	⌣94	⌢95	
14x	ℓ96	a97	b98	c99	d100	e101	f102	g103	″6x
15x	h104	i105	j106	k107	l108	m109	n110	o111	
16x	p112	q113	r114	s115	t116	u117	v118	w119	″7x
17x	x120	y121	z122	ı123	ȷ124	℘125	→126	127	
20x	ħ128	−129	=130	131	132	133	134	135	″8x
21x	136	137	138	139	140	141	142	143	
	″8	″9	″A	″B	″C	″D	″E	″F	

B.3 zeus

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	
00x	−0	·1	×2	∗3	÷4	◇5	±6	∓7	″0x
01x	⊕8	⊖9	⊗10	⊘11	⊙12	◯13	○14	●15	
02x	≍16	≡17	⊆18	⊇19	⩽20	⩾21	⪯22	⪰23	″1x
03x	∼24	≈25	⊂26	⊃27	≪28	≫29	≺30	≻31	
04x	←32	→33	↑34	↓35	↔36	↗37	↘38	≃39	″2x
05x	⇐40	⇒41	⇑42	⇓43	⇔44	↖45	↙46	∝47	
06x	′48	∞49	∈50	∋51	△52	▽53	~~54~~	~~55~~	″3x
07x	∀56	∃57	¬58	∅59	ℜ60	ℑ61	⊤62	⊥63	
10x	ℵ64	𝒜65	ℬ66	𝒞67	𝒟68	ℰ69	ℱ70	𝒢71	″4x
11x	ℋ72	ℐ73	𝒥74	𝒦75	ℒ76	ℳ77	𝒩78	𝒪79	
12x	𝒫80	𝒬81	ℛ82	𝒮83	𝒯84	𝒰85	𝒱86	𝒲87	″5x
13x	𝒳88	𝒴89	𝒵90	∪91	∩92	⊎93	∧94	∨95	
14x	⊢96	⊣97	⌊98	⌋99	⌈100	⌉101	{102	}103	″6x
15x	⟨104	⟩105	|106	‖107	↕108	⇕109	\110	≀111	
16x	√112	Π113	∇114	∫115	⊔116	⊓117	⊑118	⊒119	″7x
17x	§120	†121	‡122	¶123	♣124	♢125	♡126	♠127	
24x	160	!161	162	163	164	165	166	167	″Ax
25x	(168	)169	170	+171	172	173	174	175	
26x	176	177	178	179	180	181	182	183	″Bx
27x	184	185	:186	;187	188	=189	190	?191	
32x	208	209	210	211	212	213	214	215	″Dx
33x	216	217	218	[219	220	]221	^222	223	
	″8	″9	″A	″B	″C	″D	″E	″F	

B.4 zeuex

	0	1	2	3	4	5	6	7	
00x	 0	 1	 2	 3	 4	5	6	7	″0x
01x	 8	 9	 10	 11	12	13	14	15	
02x	 16	17	18	 19	20	21	22	23	″1x
03x	 24	 25	 26	 27	 28	29	30	31	
04x	 32	 33	 34	 35	 36	37	38	39	″2x
05x	40	41	42	43	44	45	46	47	
06x	48	49	50	51	52	53	54	55	″3x
07x	56	57	58	59	60	61	62	63	
10x	64	65	66	67	68	69	70	71	″4x
11x	72	73	74	75	76	77	78	79	
12x	80	81	82	83	84	85	86	87	″5x
13x	88	89	90	91	92	93	94	95	
14x	96	97	98	99	100	101	102	103	″6x
15x	104	105	106	107	108	109	110	111	
16x	112	113	114	115	116	117	118	119	″7x
17x	120	121	122	123	124	125	126	127	
22x	144	145	146	147	148	149	150	151	″9x
23x	152	153	154	155	156	157	158	159	
	″8	″9	″A	″B	″C	″D	″E	″F	