useful.sty 2.0

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Contents

1   Packages

Required packages are:

- amsmath
- url
- hyperref
- esint
- tcolorbox
    - skins
    - breakable
- xparse
- listings
- tikz
    - shadows.blur

- varwidth
- amssymb
- amsbsy
- colortbl
- accents
- mathtools
- stackengine
- courier
- rotating
- pdflscape
- float

2   Colour Schemes

This package provides several colour schemes with light and dark variants. Each scheme defines 9 colours (some of which may be equivalent):

- `ForegroundColour`
- `BackgroundColour`
- `Accent1`
- `Accent2`
- `Accent3`
- `Accent4`
- `Accent5`
- `AccentTextColour` (usually a slightly lighter or darker version of `BackgroundColour`)
- `DarkTextColour` (usually a darker verion of `ForegroundColour` or `BackgroundColour`)

The list of colour schemes can be found in Appendix A.

Each colour scheme can be selected by passing its name and variant **in lower case** as an option. For example, for the "Light" variant of the "Sage" scheme (which is the default), use `[sage, light]`. Colours for which only one variant exists will simply swap the foreground and background colours when the missing variant is requested, which is usually sufficient but may cause some comtrast issues with accent colours.

3 Boxes

A number of box environments are defined, and two new counters (`boxExampleCounter`, and `boxTheoremCounter`) are also defined. The boxes are:

exampleCompiled

> **Example: exampleCompiled**
>
> ```
> 1  \begin{exampleCompiled}{An example of the \texttt{exampleCompiled} box}{example:
>        exampleCompiled}
> 2  This is an example of the \texttt{exampleCompiled} box, with a label and title.
>        These can contain any \LaTeX{} commands, including other environments.
> 3  \end{exampleCompiled}
> 4  Example \ref{example:exampleCompiled} can then be referrenced normally.
> ```
>
> > **Example 1: An example of the exampleCompiled box**
> >
> > ```
> > 1  This is an example of the \texttt{exampleCompiled} box, with a label and
> >        title. These can contain any \LaTeX{} commands, including other
> >        environments.
> > ```
> >
> > This is an example of the exampleCompiled box, with a label and title. These can contain any LaTeX commands, including other environments.
>
> Example 1 can then be referrenced normally.

exampleCode

Example: exampleCode

```
1  \begin{exampleCode}{An example of the \texttt{exampleCode} box}{example:exampleCode
      }
2  This is an example of the \texttt{exampleCode} box, with a label and title. These
      can contain any \LaTeX{} commands, including other environments, but only show
      the listing. This makes them suitable for examples in other languages.
3  \end{exampleCode}
4  Example \ref{example:exampleCode} can then be referrenced normally.
```

Example 2: An example of the exampleCode box

```
1  This is an example of the \texttt{exampleCode} box, with a label and title.
      These can contain any \LaTeX{} commands, including other environments,
      but only show the listing. This makes them suitable for examples in other
      languages.
```

Example 2 can then be referrenced normally.

example

Example: example

```
1  \begin{example}{An example of the \texttt{example} box}{example:example}
2  This is an example of the \texttt{example} box, with a label and title. This box
      dispays its contents normally, not as a listing.
3  \end{example}
4  Example \ref{example:example} can then be referrenced normally.
```

Example 3: An example of the example box

This is an example of the example box, with a label and title. This box dispays its contents normally, not as a listing.

Example 3 can then be referrenced normally.

important

Example: `important`

```
1  \begin{important}{An example of the \texttt{important} box}
2  This is an example of the \texttt{important} box, with a title. This box dispays
      its contents normally, not as a listing, and has a different border to
      distinguish it from the examples.
3  \end{important}
4  The \texttt{important} box does not use a counter, so does not take a label and
      cannot be referrenced.
```

Important: An example of the `important` box

This is an example of the `important` box, with a title. This box dispays its contents normally, not as a listing, and has a different border to distinguish it from the examples.

The `important` box does not use a counter, so does not take a label and cannot be referrenced.

Each of `exampleCompiled`, `exampleCode`, and `example` have an unnumbered equivalent: `exampleCompiled*`, `exampleCode*`, and `example*`.

theorem

Example: `theorem`

```
1  \begin{theorem}{An example of the \texttt{theorem} box}{theorem:theorem}
2  This is an example of the \texttt{theorem} box, with a label and title. This box
      dispays its contents normally, not as a listing.
3  \end{theorem}
4  Theorem \ref{theorem:theorem} can then be referrenced normally.
```

Theorem 1: An example of the `theorem` box

This is an example of the `theorem` box, with a label and title. This box dispays its contents normally, not as a listing.

Theorem 1 can then be referrenced normally.

Again, this has an unnumbered equivalent, `theorem*`

4 Useful Macros

`\colvec{#1}` — Produces a column vector with elements of `#1` separated by `\\`

`\rowvec[#1]{#2}` — Produces a row vector, with columns described by `#1` (default `c c`) and elements of `#2` separated by `&`

`\matrix[#1]{#2}` — Produces a matrix, with columns described by `#1` (default `c c`) and elements of `#2`, column separated by `&` and rows by `\\`. This replaces the `\matrix` command supplied by the amsmath package.

`\bigO{#1}` — Used for writing big O notation, such as $\mathcal{O}\left(N^2\right)$.

`\st`, `\nd`, `\rd`, `\th` — produce correctly formatted ordinal suffixes (1st, 2nd, 3rd, 4^{th}etc.)

`\e{#1}` — A shorthand for `\text{e}^{#1}`, producing $\text{e}^{\#1}$

`\ee{#1}` — A shorthand for `\text{e}^{{}^{#1}}`, producing $\text{e}^{^{\#1}}$ (this is designed for large exponents such as fractions)

`\curl` — A shorthand for the curl operator, $\vec{\nabla}\times$

`\div` — A shorthand for the divergence operator, $\vec{\nabla}\cdot$

`\lap` — A shorthand for the laplacian operator, ∇^2

`\veclap` — A shorthand for the vector laplacian operator, $\vec{\nabla}^2$

`\p[#1]{#2}{#3}` — A shorthand for a partial derivative of order `#3` (default is empty, or first order) of `#2` with respect to `#3`, such as `\p[2]{y}{x}`, $\dfrac{\partial^2 y}{\partial x^2}$

`\pp{#1}{#2}{#3}` — A shorthand for a second order partial derivative of `#1` with respect to `#2` and `#3`, such as `\pp{f}{y}{x}`, $\dfrac{\partial^2 f}{\partial y \partial x}$

`\dv[#1]{#2}{#3}` — A shorthand for a full derivative of `#2` with respect to `#3` of order `#1` (default is empty, or first order), such as `\dv[2]{y}{x}`, $\dfrac{\mathrm{d}^2 y}{\mathrm{d}x^2}$

`\fdv[#1]{#2}{#3}` — A shorthand for a finite derivative of `#2` with respect to `#3` of order `#1` (default is empty, or first order), such as `\fdv{y}{x}`, $\dfrac{\delta y}{\delta x}$

`\Dv[#1]{#2}{#3}` — A shorthand for a Lagrangian derivative of `#2` with respect to `#3` of order `#1` (default is empty, or first order), such as `\Dv[2]{y}{x}`, $\dfrac{\mathrm{D}^2 y}{\mathrm{D}x^2}$

`\util{#1}` — Places a tilde accent below `#1`, `\util{a}` $\longrightarrow$ $\underset{\sim}{a}$

`\erf`	A shorthand for the error fucntion, erf
`\d`	A shorthand for `\,\text{d}` , d
`\lr`	A shorthand for `\left({#1}\right)`
`\slr`	A shorthand for `\left[{#1}\right]`
`\set`	A shorthand for `\left\lbrace{#1}\right\rbrace`
`\alr`	A shorthand for `\left\langle{#1}\right\rangle`
`\abs`	A shorthand for `\left|{#1}\right|`
`\eval`	A shorthand for `\left.{#1}\right|_{#2}`
`\setR`	A shorthand for the real set, $\mathbb{R}$
`\setC`	A shorthand for the complex set, $\mathbb{C}$
`\setZ`	A shorthand for the integer set, $\mathbb{Z}$
`\setN`	A shorthand for the natural set, $\mathbb{N}$
`\pr`	A shorthand for `{}^\prime\,`
`\anti{#1}`	A shorthand to add an overline to `#1`
`\To`	A shorthand for `\ \longrightarrow\ ` , $a \longrightarrow b$
`\pfrac{#1}{#2}`	A shorthand for smaller fractions for use in exponents, `a^\pfrac{1}{2}` , $a^{\frac{1}{2}}$.
`\chem{#1}{#2}{#3}`	A shorthand for formatting elements `#1` with atomic masses and atomic numbers `#2` and `#3`, for example `\chem{He}{2}{4.003}` , $_{4.003}^{2}\text{He}$

A   Colour Schemes

Midnight

Dark

| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |

Bold

Light
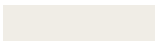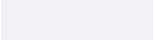
| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |

Dark

| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |

Sage

Light

| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |

Dark

BackgroundColour

ForegroundColour

Accent1

Accent2

Accent3

Accent4

Accent5

AccentTextColour

DarkTextColour

Succulent

Dark

BackgroundColour

ForegroundColour

Accent1

Accent2

Accent3

Accent4

Accent5

AccentTextColour

DarkTextColour

Muted

Light

BackgroundColour
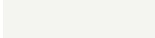
ForegroundColour

Accent1

Accent2

Accent3

Accent4

Accent5

AccentTextColour

DarkTextColour

Office 2011

Light

BackgroundColour

ForegroundColour

Accent1

Accent2

Accent3

Accent4

Accent5
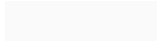
AccentTextColour

DarkTextColour

Grayscale

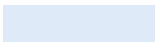**Light**

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Adjacency

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	
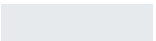
Advantage

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Angeles

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	
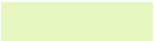
Apothecary

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	
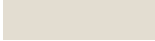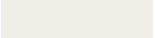
Austin

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	
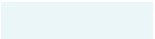
Black Tie

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Breeze

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	
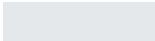
Capital

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
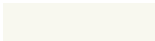
Civic

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
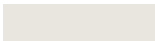
Clarity

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Couture

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Elemental

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	
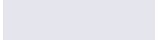
Essential

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Executive

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Expo

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Folio

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Formal

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Foundry

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Genesis

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Grid

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Habitat

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Hardcover

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Horizon

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Infusion

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
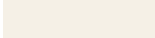
Inkwell

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Median

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Kilter

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
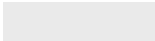
Inspiration

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
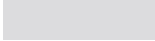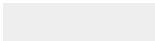
Module

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
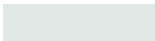
Newsprint

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Orbit

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Perspective

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Perception

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Paper

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Pixel

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Plaza

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Precedent

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Saddle

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Revolution

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Pushpin

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Sketchbook

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
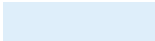
Sky

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Slipstream

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Spectrum

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	
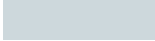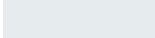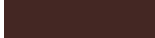
Solstice

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	
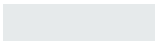
SoHo

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Story

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Summer

Light

| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |
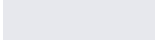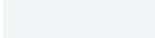
Technic

Light

| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |

Twilight

Light

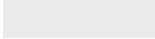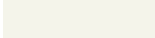| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |

Travelouge

Light

| BackgroundColour | ForegroundColour | Accent1 | Accent2 | Accent3 |
| Accent4 | Accent5 | AccentTextColour | DarkTextColour | |

Tradition

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Urban Pop

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Venture

Light

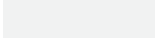| BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	

Waveform

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour	
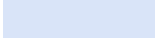
Blue

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
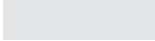
Blue Warm

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
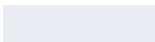
Blue II

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
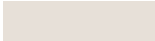
Blue Green

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Green

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	
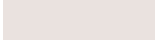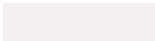
Green Yellow

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	
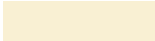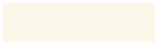
Yellow

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Yellow Orange

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
Accent4	Accent5	AccentTextColour	DarkTextColour	

Orange

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Orange Red

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Red Orange

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Red
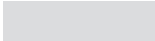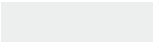
Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
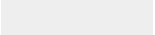
Red Violet

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
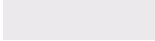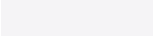
Violet

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour
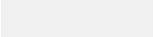
Violet II

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Marquee

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Aspect

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3
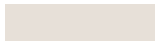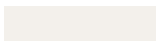
Accent4	Accent5	AccentTextColour	DarkTextColour

Office 2007-2010

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour

Office 2016

Light

BackgroundColour	ForegroundColour	Accent1	Accent2	Accent3

Accent4	Accent5	AccentTextColour	DarkTextColour