

PSTricks

pst-tools

Helper functions; v.0.09b

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This package defines some tools which are useful for all packages not only the PStricks like packages.

Thanks to: Rolf Niepraschk;

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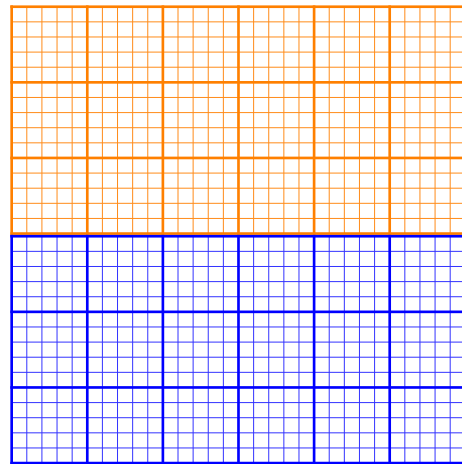
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1 Predefined styles

The style `mmpaper` is defined for `\psgrid`:

```
\begin{pspicture}(6,3)
\psgrid[style=mmpaper](6,3)
\end{pspicture}

\begin{pspicture}(6,3)
\psgrid[style=mmpaper,
gridcolor=blue,subgridcolor=blue!80](6,3)
\end{pspicture}
```



2 `\psPrintValue`

This macro allows to print single values of a math function. It has the syntax

<code>\psPrintValue</code> [Options] {PostScript code}
<code>\psPrintValue</code> [algebraic, ...] {x value, algebraic code}

Important is the fact, that `\psPrintValue` works on PostScript side. For $\text{T}_\text{E}\text{X}$ it is only a box of zero dimension. This is the reason why you have to put it into a box, which reserves horizontal space.

There are the following valid options for `\psPrintValue`:

name	value	default	
PSfont	PS font name	Times	only valid PostScript font names are possible, e.g. Times-Roman, Helvetica, Courier, Helvetica, Bookman. If you want to embed the fonts use always the URW names <code>NimbusRomNo9L-Regu</code> , <code>NimbusSanL-Regu</code> and <code>NimbusMonL-Regu</code> . However, the names may vary on different operating systems.
postString	<string>	{}	will be appended to the number string

name	value	default	
trimSpaces	<boolean>	false	will strip spaces on the right
fontscale	<number>	10	the font scale in pt
valuewidth	<number>	10	the width of the string for the converted real number; if it is too small, no value is printed
decimals	<number>	-1	the number of printed decimals, a negative value prints all possible digits.
xShift	<number>	0	the x shift in pt for the output, relative to the current point.
algebraic	<boolean>	false	function in algebraic notation.
VarName	<string>	{}	saves the value in /<VarName> for further use
comma	<boolean>	false	comma instead of the dor for decimals

x(deg)	sin x	cos x	\sqrt{x}	sin x + cos x	sin ² x + cos ² x
0	0.0	1.0	0.0	1,0	1.0
10	0.173648	0.984	3.16228	1,15846	1.0
20	0.34202	0.939	4.47214	1,28171	1.0
30	0.5	0.866	5.47723	1,36603	1.0
40	0.642788	0.766	6.32456	1,40883	1.0
50	0.766044	0.642	7.07107	1,40883	1.0
60	0.866025	0.5	7.74597	1,36603	1.0
70	0.939693	0.342	8.3666	1,28171	1.0
80	0.984808	0.173	8.94427	1,15846	1.0
90	1.0	0.0	9.48683	1,0	1.0
100	0.984808	-0.173	10.0	0,81116	1.0
110	0.939693	-0.342	10.4881	0,597672	1.0
120	0.866025	-0.5	10.9545	0,366025	1.0
130	0.766044	-0.642	11.4018	0,123257	1.0
140	0.642788	-0.766	11.8322	-0,123257	1.0
150	0.5	-0.866	12.2474	-0,366025	1.0
160	0.34202	-0.939	12.6491	-0,597672	1.0
170	0.173648	-0.984	13.0384	-0,81116	1.0

```

\psset{fontscale=12}
\makebox[2em]{x(deg)} \makebox[5em]{\sin x$} \makebox[4em]{\cos x$}\hspace{1em}
\makebox[5em]{\sqrt x$}\makebox[7em]{\sin x+\cos x$}\makebox[6em]{\sin^2 x+\cos^2 x$}\[3pt]
\multido{\iA=0+10}{18}{
\makebox[1em]{\iA}
\makebox[5em]{\psPrintValue[PSfont=NimbusRomNo9L-Regu,xShift=-10]{\iA\space sin}}
\makebox[4em][r]{\psPrintValue[PSfont=NimbusMonL-Regu,fontscale=10,decimals=3,xShift=-20]{\iA\space cos}}\hspace{1em}
\makebox[5em]{\psPrintValue[valuewidth=15,linecolor=blue,PSfont=NimbusSanL-Regu]{\iA\space sqrt}}
\makebox[7em]{\psPrintValue[comma,PSfont=NimbusRomNo9L-ReguItal]{\iA\space dup sin exch cos add}}
\makebox[6em]{\psPrintValue[PSfont=Palatino-Roman]{\iA\space dup sin dup mul exch cos dup mul add}}\}

```

With enabled algebraic option there must be two arguments, separated by a comma. The first one is the x value as a number, which can also be PostScript code, which leaves a number on the stack. The second part is the function described in algebraic notation. Pay attention, in algebraic notation angles must be in radian and not degrees.

$x(\text{deg})$	$\sin x$	$\cos x$	\sqrt{x}	$\sin x + \cos x$	$\sin^2 x + \cos^2 x$
0.0	0.0	1.0	0.0	1,0	1.0
0.1	0.0998334	0.995	0.316228	1,09484	1.0
0.20001	0.198679	0.98	0.447225	1,17874	1.0
0.30002	0.295539	0.955	0.547741	1,25087	1.0
0.40002	0.389437	0.921	0.632471	1,31049	1.0
0.50003	0.479452	0.877	0.707128	1,35702	1.0
0.60004	0.564676	0.825	0.774622	1,38999	1.0
0.70004	0.644248	0.764	0.836684	1,40906	1.0
0.80005	0.717391	0.696	0.894455	1,41406	1.0
0.90005	0.783358	0.621	0.94871	1,40493	1.0
1.00006	0.841503	0.54	1.00003	1,38176	1.0
1.10007	0.891239	0.453	1.04884	1,34477	1.0
1.20007	0.932064	0.362	1.09548	1,29436	1.0
1.30008	0.96358	0.267	1.14021	1,231	1.0
1.40009	0.985465	0.169	1.18325	1,15534	1.0
1.50009	0.997501	0.07	1.22478	1,06815	1.0
1.6001	0.999571	-0.029	1.26495	0,970271	1.0
1.7001	0.991652	-0.128	1.30388	0,862708	1.0

```

\psset{algebraic, fontscale=12}% All functions now in algebraic notation
\makebox[2em]{x(deg)} \makebox[5em]{\sin x} \makebox[4em]{\cos x}\hspace{1em}
\makebox[5em]{\sqrt{x}}\makebox[7em]{\sin x+\cos x}\makebox[6em]{\sin^2 x+\cos^2 x}\hspace{3pt}
\multido{\rA=0+0.1}{18}{\makebox[1em]{\rA}
  \makebox[5em]{\psPrintValue[PSfont=NimbusSanL-Regu,xShift=-10]{\rA, sin(x)}}
  \makebox[4em][r]{\psPrintValue[PSfont=NimbusMonL-Regu,fontscale=10,decimals=3,xShift=-20]{\rA,cos(
  x)}}\hspace{1em}
  \makebox[5em]{\psPrintValue[valuelwidth=15,linecolor=blue,PSfont=NimbusSanL-Regu]{\rA, sqrt(x)}}
  \makebox[7em]{\psPrintValue[comma,PSfont=NimbusRomNo9L-ReguItal]{\rA, sin(x)+cos(x)}}
  \makebox[6em]{\psPrintValue[PSfont=Palatino-Roman]{\rA, sin(x)^2+cos(x)^2}\hspace{1em}}

```

foo 3,1 bar
foo 3,1° bar
foo 9.8596° bar

```

foo \makebox[2em][l]{\psPrintValue[comma]{3.14 10 mul round 10 div}}bar\hspace{3pt}
foo \makebox[2em][l]{\psPrintValue[comma,PSfont=StandardSymL,
postString=\string\260]{3.14 10 mul round 10 div}}bar\hspace{3pt}
foo \makebox[3.5em][l]{\psPrintValue[PSfont=StandardSymL,decimals=6,
postString=\string\260]{3.14 dup mul}}bar

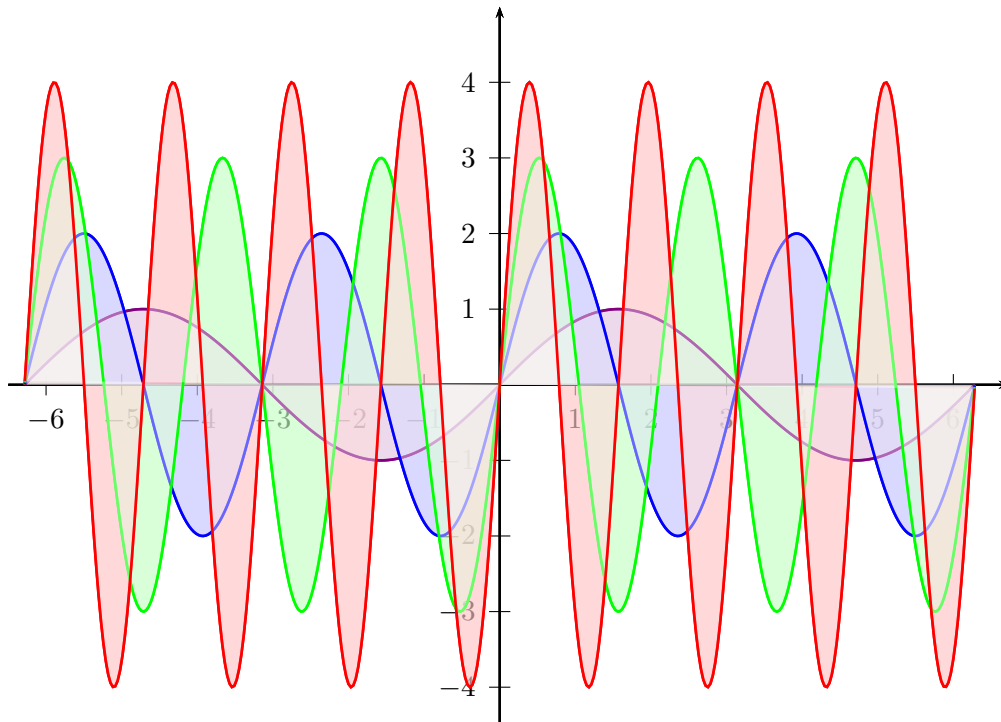
```

3 \psRegisterList

The macro defines for every list item an own macro for an easy access to the items. It must be a comma separated list.

```
\psRegisterList{Name}{value list}
\<Name>{Index}
```

```
\psRegisterList{Color}{violet,blue,green,red}% defines macro \Color
\begin{pspicture}(-7,-4.5)(7,5.5)
\psaxes{->}(0,0)(-6.5,-4.5)(6.75,5)
\psset{plotpoints=400,algebraic,linewidth=1pt,fillstyle=solid,opacity=0.4}
\multido{\iA=1+1}{4}{%
\psplot[linecolor=\Color{\iA},
fillcolor=\Color{\iA}!60]{-6.283}{6.283}{\iA*sin(\iA*x)}}%
\psset{plotpoints=400,algebraic}
\psforeach{\iA}{1,2,3,4}{%
\psplot[linecolor=\Color{\iA}]{-6.28}{6.28}{\iA*sin(\iA*x)}}
\end{pspicture}
```



4 List of the defined PostScript functions

```
/Pi2 1.57079632679489661925640 def
/factorial { % n on stack, returns n!
/MoverN { % m n on stack, returns the binomial coefficient m over n
/ps@ReverseOrderOfPoints { % on stack [P1 P2 P3 ...Pn]=>[Pn,Pn-1,...,P2,P1]
/cxadd { % [a1 b1] [a2 b2] = [a1+a2 b1+b2]
/cxneg { % [a b]
/cxsub { cxneg cxadd } def % same as negative addition
/cxmül { % [a1 b1] [a2 b2]
/cxsqr { % % [a b]^2 = [a^2-b^2 2ab] = [a2 b2]
/cxsqrt { %
```

```
/cxarg { % [a b]->arg(z)=atan(b/a)
/cxlog { % [a b]->log[a b] = [a^2-b^2 2ab] = [a2 b2]
/cxnorm2 { % [a b]->a^2+b^2
/cxnorm { %
/cxconj { % [a b]->[a -b]
/cxre { 0 get } def % real value
/cxim { 1 get } def % imag value
/cxrecip { % [a b]->1/[a b] = ([a -b]/(a^2+b^2)
/cxmake1 { 0 2 array astore } def % make a complex number, real given
/cxmake2 { 2 array astore } def % dito, both given
/cxdiv { cxrecip cxmul } def
/cxrmul { % [a b] r->[r*a r*b]
/cxrdiv { % [a b] r->[1/r*a 1/r*b]
/cxconv { % theta->exp(i theta) = cos(theta)+i sin(theta) polar<->cartesian
/bubblesort { % on stack must be an array [ ... ]
/concatstringarray{ % [(a) (b) ... (z)] --> (ab...z) 20100422
/concatstrings{ % (a) (b) -> (ab)
/reversestring { % (aBC) -> (CBa)
/concatarray{ % [a c] [b d] -> [a c b d]
/dot2comma { % on stack a string (...)
/rightTrim { % on stack the string and the character number to be stripped
/psStringwidth /stringwidth load def
/psShow /show load def
```

5 List of all optional arguments for pst-tools

Key	Type	Default
decimalSeparator	ordinary	.
comma	boolean	true
trimSpaces	boolean	true
xShift	ordinary	0
yShift	ordinary	0
postString	ordinary	
VarName	ordinary	
PSfont	ordinary	NimbusRomNo9L-Regu
valuewidth	ordinary	10
fontscale	ordinary	10
decimals	ordinary	-1
round	boolean	true
science	boolean	true

totoc

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- [2] Michel Goosens et al. *The L^AT_EX Graphics Companion*. 2nd ed. Reading, Mass.: Addison-Wesley Publishing Company, 2007.
- [3] Alan Hoenig. *T_EX Unbound: L^AT_EX & T_EX Strategies, Fonts, Graphics, and More*. London: Oxford University Press, 1998.
- [4] Nikolai G. Kollock. *PostScript richtig eingesetzt: vom Konzept zum praktischen Einsatz*. Vaterstetten: IWT, 1989.
- [5] Frank Mittelbach and Michel Goosens et al. *The L^AT_EX Companion*. 2nd ed. Boston: Addison-Wesley Publishing Company, 2004.
- [6] Herbert Voß. *PSTricks Grafik für T_EX und L^AT_EX*. 7th ed. Heidelberg/Berlin: DANTE and Lehmanns, 2016.
- [7] Herbert Voß. *PSTricks Graphics for L^AT_EX*. 1st ed. Cambridge: UIT, 2011.
- [8] Timothy Van Zandt. *multido.tex - a loop macro, that supports fixed-point addition*. [CTAN:/graphics/pstricks/generic/multido.tex](http://ctan.org/graphics/pstricks/generic/multido.tex), 1997.
- [9] Timothy Van Zandt. *PSTricks - PostScript macros for generic T_EX*. <http://www.tug.org/application/PSTricks>, 1993.
- [10] Timothy Van Zandt and Denis Girou. “Inside PSTricks”. In: *TUGboat* 15 (Sept. 1994), pp. 239–246.

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