

The `tablists` package*

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Abstract

This package gives variant of environment for creating of list of short items in the way of tabular alignment. That could be useful for list of exercises in math educational literature. It allows to build one-level and two-level tabulated lists.

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1 Building Commands

`tabenum` The `tabenum` environment prints short items aligned in columns.
`\tabenumitem` Each item starts with `\tabenumitem` command; you may use the `\item` macro
`\item` instead of `\tabenumitem` in this environment. First example of `tabenum` list—
please note that you may set optional argument in the same way as in modified
environments from `enumerate` or `paralist` packages:

```
\begin{tabenum}[\bfseries1)]%
\tabenumitem
$z=\displaystyle\frac{xy}{x^2+y^2};
\tabenumitem
$2^x=9;$\cr

\tabenumitem
$3^{2x+3}=16 $;
\tabenumitem
$z=2x^2+4y^2$;\par
\item
$u=\sqrt{x^2+y^2+z^2}$;
\item
$w=gt+\displaystyle\frac{g}{4}t$;\[1ex]
\item
$u=2^{5x-3y+z}$;
\item
$w=(v+7)^2+(u-3)^2$;

\item
$5^x=\displaystyle\frac{4}{3}$;
\item
$z=(x+1)^2+y^2$;\[*]
\item
$2+5+8+\ldots+(3n+2)=155$, $n\in\mathrm{N}$;
\item
$t=5u^2+8v^2$;
\end{tabenum}
```

$$1) \ z = \frac{x}{y};$$

$$2) \ 2^x = 9;$$

$$3) \ 3^{2x+3} = 4;$$

$$4) \ z = 2x^2 + 4y^2;$$

$$5) \ u = \sqrt{x^2 + y^2 + z^2};$$

$$6) \ v = gt + \frac{g}{4}t;$$

$$7) \ u = 2^{5x-3y+z};$$

$$8) \ w = (v + 7)^2 + (u - 3)^2;$$

9) $5^x = \frac{4}{3}$;

10) $z = (x + 1)^2 + y^2$;

11) $2 + 5 + 8 + \dots + (3n + 2) = 155, n \in \mathbb{N};$ **12)** $t = 5u^2 + 8v^2;$

12) $t = 5u^2 + 8v^2$;

You may see that empty line (or `\par` command), `\\` command and `\cr` do the same: start a new row. The `\\` macro works like in array environment and allows optional argument with vertical correction. (Also the `*` command suppresses breaking between pages, see next example.)

Please note that two or more `\par's` `\cr's` or `\v's` (and also any combination of these three commands) create additional empty lines.

<code>\notabenumitem</code>	On the next step you can wish to do the list like before more compact. The
<code>\noitem</code>	<code>\multicolumn</code> does not work here correctly ¹ . At first you may use plain T _E X's
<code>\skipitem</code>	command <code>\hidewidth</code> to hide width of widest column entry; then you may use
	other variant of <code>\tabenumitem(\item)</code> command— <code>\notabenumitem(\noitem)</code> —
	this command increases list entry, but does not create a new column; third com-
	mand <code>\skipitem</code> allows you to skip one <code>\tabenum</code> column ² . Next example show
	usage of these three commands:

```

\begin{tabenum}[\bfseries1)]%
\tabenumitem
$z=\displaystyle\frac{xy$;
\notabenumitem
$2^x=9;$
\tabenumitem
$3^{2x+3}=4$.
\tabenumitem
$z=2x^2+4y^2$;\nopagebreak

\item
$u=\sqrt{x^2+y^2+z^2}$;
\item
$v=gt+\displaystyle\frac{g}{4}t$,
\item
$u=2^{5x-3y+z}$. \cr
\item
$w=(v+7)^2+(u-3)^2$;
\item
$5^x=\displaystyle\frac{4}{3}$;
\item
$z=(x+1)^2+y^2$;\*
\item
$2+5+8+\ldots+(3n+2)=155$,
    $n\in\mathrm{N}$;\hidewidth\skipitem
\item
$t=5u^2+8v^2$;

```

¹ Also the plain T_EX's commands like `\omit` and `\span/\multispan` commands, I think, need too complex code.

²The `tabenum` column includes two columns: it works like `rl` columns in `tabular` environment. Thus, `\skipitem` equals to `&&` combination.

`\end{tabenum}`

- 1) $z = \frac{x}{y}$; 2) $2^x = 9$; 3) $3^{2x+3} = 4$. 4) $z = 2x^2 + 4y^2$;
- 5) $u = \sqrt{x^2 + y^2 + z^2}$; 6) $v = gt + \frac{g}{4}t$, 7) $u = 2^{5x-3y+z}$.
- 8) $w = (v+7)^2 + (u-3)^2$; 9) $5^x = \frac{4}{3}$; 10) $z = (x+1)^2 + y^2$;
- 11) $2 + 5 + 8 + \dots + (3n+2) = 155, n \in \mathbb{N}$; 12) $t = 5u^2 + 8v^2$;

1.1 Spacing

Vertical spaces around tabulated list are equal to the list ones `\topsep+\partopsep`.

Space between rows depends on the `\jot` value, like in `amsmath` environments like `align`, `gather` etc.

`\tabenumsep` The horizontal spacing between items of list. It defined like:

`\newcommand\tabenumsep{\hspace{1em}}`

The `\labelsep` parameter is used after item number.

1.2 The tabenum environment inside a proper list

`\tabenumindent` The `\tabenumindent` macro sets left margin of `tabenum`. That could be useful inside, e.g., a proper list environments like `enumerate` or `itemise`. It can be defined like horizontal space/skip or text. For example:

`\renewcommand\tabenumindent{\hspace{\parindent}}`

or

`\renewcommand\tabenumindent{Word }`

`\liststrut` This command can be useful after alone list number (and not only with `tabenum` environment). The command raises first line of next text block at the baseline of previous. Without any option it puts negative baselineskip. If there is a high element (any math sentence) in the first line of next text, it must be written in option, the height of this argument used for compensating skips argument without `$`'s.

Here the combination of these two commands:

```
\begin{enumerate}[\bfseries1)]%
\item\renewcommand\tabenumindent{1)\hspace{\labelsep}}%
  \liststrut[\displaystyle\frac{xy}]
\begin{tabenum}[a)]%
...
```

- 1) a) $z = \frac{x}{y}$; b) $2^x = 9$; c) $3^{2x+3} = 4$. d) $z = 2x^2 + 4y^2$;
- e) $u = \sqrt{x^2 + y^2 + z^2}$; f) $v = gt + \frac{g}{4}t$, g) $u = 2^{5x-3y+z}$.

$$\begin{array}{lll} \text{h)} \ w = (v+7)^2 + (u-3)^2; & \text{i)} \ 5^x = \frac{4}{3}; & \text{j)} \ z = (x+1)^2 + y^2; \\ \text{k)} \ 2+5+8+\dots+(3n+2)=155, n \in \mathbb{N}; & & \text{l)} \ t = 5u^2 + 8v^2; \end{array}$$

1.3 The subtabenum environment: second level, variant I

`subtabenum` The second level of equations/exersizes list `subtabenum` based on `tabular` environment.

```
\begin{tabenum}[\bfseries 1)]%
\item
\begin{subtabenum}[a)]%
\tabenumitem

$$z = \frac{xy}{x+y}$$

\notabenumitem
 $2^x = 9$ ;
\item
 $3^{2x+3} = 4$  .
\item

$$z = 2x^2 + 4y^2$$
;
\end{subtabenum}

\item
\begin{subtabenum}[a)]%
\item

$$u = \sqrt{x^2 + y^2 + z^2}$$
;
\item

$$v = gt + \frac{g}{4}t$$
,
\item

$$u = 2^{5x-3y+z}$$
.
\item

$$w = (v+7)^2 + (u-3)^2$$
;
\item

$$5^x = \frac{4}{3}$$
 ;
\item

$$z = (x+1)^2 + y^2$$
;
\item
 $2+5+8+\ldots+(3n+2)=155$ ,  $n \in \mathbb{N}$ ;
\item

$$t = 5u^2 + 8v^2$$
;
\end{subtabenum}
\end{tabenum}
```

$$\begin{array}{lll} \text{1) a)} \ z = \frac{x}{y}; & \text{b)} \ 2^x = 9; & \text{c)} \ 3^{2x+3} = 4. & \text{d)} \ z = 2x^2 + 4y^2; \\ \text{2) a)} \ u = \sqrt{x^2 + y^2 + z^2}; & \text{b)} \ v = gt + \frac{g}{4}t, & \text{c)} \ u = 2^{5x-3y+z}. \\ & \text{d)} \ w = (v+7)^2 + (u-3)^2; & \text{e)} \ 5^x = \frac{4}{3}; & \text{f)} \ z = (x+1)^2 + y^2; \\ & \text{g)} \ 2+5+8+\dots+(3n+2)=155, n \in \mathbb{N}; & \text{h)} \ t = 5u^2 + 8v^2; \end{array}$$

Please note that `\hidewidth` skip is followed by the `\strut` command inside `subtabenum` environment: the skips at the “edges” of `tabular` columns doesn’t work.

1.4 The `\subtabenumitem`/`\subitem` macros: second level, variant II

The previous example shows that columns were destroyed from one `subtabenum` environment to another.

There is another variant for two-level tabulated list. If you use second option in `tabenum` environment, you may use `\subtabenumitem`/`\subitem` commands for the second level.

`\subtabenumitem` If you put `\subitem` after `\item`, you get extra space between two numbers,
`\subitem` created by `\tabenumsep` skip. The `\negtabenumsep` command cancels this skip.

```
\def\tabenumsep{\quad}
\begin{tabenum}[\bfseries 1)][a)]%
\tabenumitem\negtabenumsep
\subtabenumitem
$z=\displaystyle\frac{xy}{x+y};
\nosubtabenumitem
$2^x=9;$
\subtabenumitem
$3^{2x+3}=4$ .
\subtabenumitem
$z=2x^2+4y^2$;\\
\startnumber{4}\startsubnumber{1}
\item\negtabenumsep
\subitem
$u=\sqrt{x^2+y^2+z^2}$;
\subitem
$v=gt+\displaystyle\frac{g}{4}t$,
\subitem
$u=2^{5x-3y+z}$.\skipitem\negtabenumsep
\subitem
$w=(v+7)^2+(u-3)^2$;
\subitem
$5^x=\displaystyle\frac{4}{3}$ ;$
\subitem
$z=(x+1)^2+y^2$;\skipitem\negtabenumsep
\subitem
$2+5+8+\ldots+(3n+2)=155$, $n\in\mathrm{N}$;\hidewidth\skipitem
\subitem
$t=5u^2+8v^2$;
\end{tabenum}
```

- 1) a) $z = \frac{x}{y}$; b) $2^x = 9$; c) $3^{2x+3} = 4$. d) $z = 2x^2 + 4y^2$;
 4) a) $u = \sqrt{x^2 + y^2 + z^2}$; b) $v = gt + \frac{g}{4}t$, c) $u = 2^{5x-3y+z}$.

$$\begin{array}{lll} \text{d) } w = (v + 7)^2 + (u - 3)^2; & \text{e) } 5^x = \frac{4}{3}; & \text{f) } z = (x + 1)^2 + y^2; \\ \text{g) } 2 + 5 + 8 + \dots + (3n + 2) = 155, n \in \mathbb{N}; & & \text{h) } t = 5u^2 + 8v^2; \end{array}$$

There were used two commands `\startnumber` and `\startsubnumber` which set next start numbers for items of each of two levels. There is not restarting commands for numeration of second level inside environment, so, in this case, we need set new start of sublevel by hand. The `\startnumber`³ allows you to divide `tabenum` environment and restart with necessary counter. You may still use the traditional `\setcounter{enum..}{..}` combination, if you know the level of your list and `tabenum`/`subtabenum` environments.

1.5 Restoring of `\item` as command from list environments

`\restorelistitem` For the cases when standard lists appear inside `tablist`, you may restore original `\item` meaning.

³The `\startnumber` command can be used inside any list environment.

2 Code of package

First goes request of makecell package.

```
1 \RequirePackage{makecell}
```

The horizontal separation space between items/columns.

```
2 \newcommand\tabenumsep{\hskip1em}
```

```
3 \newcommand\negtabenumsep{\settowidth\@tempdima{\tabenumsep}\hspace*{~\@tempdima}}
```

`\tabenumitem` Definition of aligned items of ‘tabular’ed list

```
\subtabenumitem 4 \newcommand\tabenumitem{&\@ifnextchar[%]
```

```
5 {\TeXr@tabenumitem{&}}%
```

```
6 {\TeXr@tabenumitem{&}{\@enumctr}}}
```

The macro for second level of tabulated items.

```
7 \newcommand\subtabenumitem{&\@ifnextchar[%]
```

```
8 {\TeXr@tabenumitem{&}}%
```

```
9 {\TeXr@tabenumitem{&}{\@subenumctr}}}
```

The macros for list and optional numeration.

```
10 \newcommand\TeXr@tabenumitem[2]{%
```

```
11 \refstepcounter{#2}\@nameuse{label#2}#1}
```

```
12 \@ifdefinable\TeXr@tabenumitem{}
```

```
13 \def\TeXr@tabenumitem#1[#2]{#{#2}#1}
```

`\notabenumitem` Definition of not aligned items with emulation of spaces around. The starred form
`\nosubtabenumitem` of `\notabenumitem` skips space before number.

```
14 \newcommand\notabenumitem{\@ifstar
```

```
15 {\TeXr@notabenumitem{\@enumctr}}%
```

```
16 {\tabenumsep\TeXr@notabenumitem{\@enumctr}}}
```

The macro for second level of tabulated items.

```
17 \newcommand\nosubtabenumitem{\@ifstar
```

```
18 {\TeXr@notabenumitem{\@subenumctr}}%
```

```
19 {\tabenumsep\TeXr@notabenumitem{\@subenumctr}}}
```

```
20 \newcommand\TeXr@notabenumitem[1]{\@ifnextchar[%]
```

```
21 {\TeXr@tabenumitem{\hskip\labelsep}}%
```

```
22 {\TeXr@tabenumitem{\hskip\labelsep}{#1}}}
```

`\skipitem` Command allows to skip column of items in tabulated list. One item column occupies two tabular ones and needs `&&` for skipping

```
23 \newcommand\skipitem[1][1]{\count@=#1\multiply\count@2\advance\count@\@ne
```

```
24 \eline{\count@}}
```

`\tabenumindent` If this command empty there is no any indentation. To set necessary indentation you may define this command as any text or horizontal skip.

```
25 \newcommand\tabenumindent{}
```


`tabenum` Start of definition of tabulated lists themselves—`tabenum` and `rtabenum`. They allow usage of optional argument in the same way as in `enumerate` environment from `paralist` package. The second definition, `rtabenum`, replaces `\Alph/\alph` numeration for `A/texttt` entries by Russian `\Asbuk/\asbuk` numeration.

```
26 \newenvironment{rtabenum}{\let\Alph\Asbuk\let\alph\asbuk
27 \begin{tabenum}}{\end{tabenum}}
```

These environments use mechanism of optional argument from `\@enumlabel` command.

```
28 \newcommand\tabenum{\@ifnextchar[{\TeXr@tabenum@}{\TeXr@tabenum@[]}}
29 \@ifdefinable\TeXr@tabenum@{}
30 \def\TeXr@tabenum@[#1]{\@ifnextchar[{\TeXr@tabenum@[#1]}{\TeXr@tabenum@[#1] []}}
```

These environments allow two options for item numeration and subitem numeration.

```
31 \@ifdefinable\TeXr@tabenum@{}
32 \long\def\TeXr@tabenum@[#1][#2]{\par
33 \addpenalty\@beginparpenalty
```

Vertical spaces around `tabenum` similar to spaces in list environments. The space above reduced by `\jot` to make it equal to the space below.

```
34 \@topsepadd\topsep\advance\@topsepadd\partopsep
35 \advance\@topsepadd-\jot
36 \ifdim\@topsepadd<\z@\@topsepadd=\z@\fi
37 \if@nbreak\else\addvspace\@topsepadd\fi
```

Interline spacing enlarged by `\jot` as in `amsmath`'s environments like `align` etc.

```
38 \openup\jot
```

Check for list depth and settings for first level. If it exceeded, the error message pops out.

```
39 \ifnum\@enumdepth>\thr@@
40 \toodeep
41 \else
42 \advance\@enumdepth\@ne
43 \edef\@enumctr{enum\romannumeral\the\@enumdepth}%
44 \setcounter{\@enumctr}\z@
45 \let\item\tabenumitem\let\noitem\notabenumitem
```

Check for list depth and settings for second level. If it exceeded, one level used.

```
46 \ifnum\@enumdepth>\thr@@
47 \PackageWarning{tablists}{tablist has one level}{}%
48 \let\subitem\tabenumitem\let\nosubitem\notabenumitem%
49 \else
50 \let\subitem\subtabenumitem\let\nosubitem\nosubtabenumitem
51 \advance\@enumdepth\@ne
52 \edef\@subenumctr{enum\romannumeral\the\@enumdepth}%
53 \setcounter{\@subenumctr}\z@
54 \fi
55 \fi
```

Checks for first option. If option is absent used default enumerating.

```
56 \def\tempa{#1}\ifx\tempa\empty\else
57 \TeXr@enumlabel@{#1}{\@enumctr}\fi
```

Checks for second option. If option is absent used default enumerating.

```
58 \def\tempa{#2}\ifx\tempa\empty\else
59 \TeXr@enumlabel@{#2}{\@subenumctr}\fi
60 \@TeXr@tabenum
61 }
```

There building macro for item/subitem labels.

```
62 \newcommand\TeXr@enumlabel@[2]{%
63 \@tempcnta0
64 \TeXr@lab{}\def\TeXr@label{\TeXr@label@{#2}}%
65 \expandafter\TeXr@loop\@gobble{#1}\@@@
66 \ifnum\@tempcnta=1\else
67 \PackageWarning{tablists}{Incorrect label; no or multiple
68 counters.\MessageBreak The label is: \@gobble#1}%
69 \fi
70 \expandafter\edef\csname label#2\endcsname{\the\TeXr@lab}%
71 \expandafter\let\csname the#2\endcsname\TeXr@the%
72 }
```

For column alignment is used `\halign` command of plain \TeX . In this case `tabenum/rtabenum` environments can run through a few pages.

```
73 \newcommand{\@TeXr@tabenum}{\begingroup
74 \let\\\TeXr@arraycr\TeXr@tlist@arrayjot\let\par=\cr
75 \settowidth\@tempdima{\tabenumindent}%
76 \settowidth\@tempdimb{\tabenumsep}%
77 \halign\bgroup
78 \strut#\hskip\@tempdima
79 \hskip-\@tempdimb&&\tabenumsep\hfil#\hskip\labelsep&#\hfil\cr}
```

Finish of `tabenum` environment.

```
80 \def\endtabenum{\crr\egroup\endgroup\gdef\tabenumindent{}\par
81 \addpenalty\@endparpenalty
82 \advance\@topsepadd\jot
83 \addvspace\@topsepadd}
```

subtabenum The tabulated list of second level. This list uses a real `tabular` environment. In
rsubtabenum this case it is placed in one page. This list as its parent environment use optional
argument in the way of `paralist`'s `enumerate`.

```
84 \newcommand\subtabenum[1][]{\TeXr@tlist@arrayjot
85 \setcounter{\@subenumctr}\z@
86 \def\tempa{#1}\ifx\tempa\empty\else
87 \TeXr@enumlabel@{#1}{\@subenumctr}\fi
88 \let\item\subtabenumitem\let\noitem\nosubtabenumitem
89 \let\tabenumitem\subtabenumitem\let\notabenumitem\nosubtabenumitem
90 \let\subitem\subtabenumitem\let\nosubitem\nosubtabenumitem
91 \@TeXr@subtabenum
92 }
```

```

93 \newcommand{\@TeXr@subtabenum}{%
94     \hbox{\ifnum0='}\fi
95     \begin{tabular}[t]{@{\tabenumindent}l@{}}*{12}{r@{\hskip\labelsep}l@{\tabenumsep}}@{}}%
96 }
97 \def\endsubtabenum{\end{tabular}}%
98     \ifnum0='{ \fi}\gdef\tabenumindent{}}

```

Russified environment with \Asbuk/\asbuk counters instead of \Alph/\alph.

```

99 \newenvironment{rsubtabenum}{\let\Alph\Asbuk\let\alph\asbuk
100 \begin{subtabenum}}{\end{subtabenum}}

```

\arrayjot The redefinition of \jot command inside tabular to enlarge interline spacing by \jot value—to create analogous spacing to parent, tabenum, environment.

```

101 \@ifdefinable\TeXr@rixarraycr{}
102 \let\TeXr@rixarraycr\TeXr@xarraycr
103 \newcommand\TeXr@Xarraycr{\@ifnextchar [ \TeXr@Xargarraycr {\@argarraycr[\jot]}}
104 \@ifdefinable\TeXr@Xargarraycr{}
105 \def\TeXr@Xargarraycr[#1]{\@tempdima\jot\advance\@tempdima#1%
106     \argarraycr[\@tempdima]}
107 \@ifdefinable\TeXr@arrayjot{}
108 \def\TeXr@arrayjot [#1]{\let\@xarraycr\TeXr@Xarraycr\jot#1}
109 \def\noarrayjot{\let\@xarraycr\TeXr@rixarraycr}
110 \newcommand\TeXr@tlist@arrayjot {\@ifnextchar {\TeXr@arrayjot{\TeXr@arrayjot[\jot]}}
111 \AtBeginDocument{\let\arrayjot\TeXr@tlist@arrayjot}
112 \def\TeXr@arraycr{%
113     \relax\iffalse{\fi\ifnum 0='}\fi\@ifstar{\vadjust{\penalty\@M}\@xarraycr}\@xarraycr}

```

\startnumber The variant of \setcounter{enum..}{..} sentence. This command sets start number of current list (you must put this command inside of list or tabenum environment). The \setcounter{enum..}{..} sentence needs previous number, but \startnumber needs a real start number of a list.

```

114 \newcommand\startnumber[1]{\count@#1\advance\count@-1%
115     \global\expandafter\csname c@\@enumctr\endcsname\count@}
116 \newcommand\startsubnumber[1]{\count@#1\advance\count@-1%
117     \global\expandafter\csname c@\@subenumctr\endcsname\count@}

```

\liststrut For the cases of tablist appears just after empty enumerate (or analogous) list entry. This command inserts negative \baselineskip and put start of 'tabular'ed list on the baseline of list number.

Optional argument allows to align baselines in the case of height elements in first line of tablist

```

118 \newcommand\liststrut[1][\def\tempa{#1}\ifx\tempa\empty
119     \strut
120     \@tempdima-1.3\baselineskip
121     \vspace*{\@tempdima}\par%
122 \else\settoheight\@tempdima{${#1$}}\strut
123     \advance\@tempdima\lineskip
124     \noindent\vrule\@height\@tempdima\@width\z@\@depth\z@
125     \strut\advance\@tempdima.3\baselineskip

```

```

126     \vspace*{-\@tempdima}\par%
127     \fi
128     \@nobreaktrue}

\restorelistitem For the cases when standard lists appear inside tablist.
129 \let\TeXr@orilistitem\item
130 \newcommand\restorelistitem{\let\item\TeXr@orilistitem}

```