The tablists package*

Olga Lapko

`Lapko.O@g23.relcom.ru`

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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

The `tabenum` environment prints short items aligned in columns.

Each item starts with `\tabenumitem` command. 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
$z=\displaystyle\frac xy$;
\tabenumitem
$2^x=9;$\cr

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


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

1) $z = \dfrac{x}{y}$;   **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)** $v = gt + \dfrac{g}{4}t$;

7) $u = 2^{5x-3y+z}$;   **8)** $w = (v+7)^2 + (u-3)^2$;

9) $5^x = \dfrac{4}{3}$;   **10)** $z = (x+1)^2 + y^2$;

11) $2 + 5 + 8 + \ldots + (3n+2) = 155, n \in \mathrm{N}$;   **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 `\\`'s (and also any combination of these three commands) create additional empty lines.

You may use the `\item` macro instead of `\tabenumitem` in this `tabenum` environments (see next examples).

`\notabenumitem`
`\noitem`
`\skipitem`

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

```
\begin{tabenum}[\bfseries1)]%
\item
$z=\displaystyle\frac xy$;
\noitem
$2^x=9;$
\item
$3^{2x+3}=4 $.
\item
$z=2x^2+4y^2$;\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
$t=5u^2+8v^2$;
\end{tabenum}
```

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

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

1) $z = \dfrac{x}{y}$; **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)** $v = gt + \dfrac{g}{4}t$, **7)** $u = 2^{5x-3y+z}$.

8) $w = (v+7)^2 + (u-3)^2$; **9)** $5^x = \dfrac{4}{3}$; **10)** $z = (x+1)^2 + y^2$;

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

The items 1 and 2 were joined in one column: the item 2 used `\noitem` (`\notabenumitem`) command. The item 11 occupies two columns, so it uses the `\hidewidth` (hides item width) and `\skipitem` (skips column of next item) commands.

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{\hskip1em}
```

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{\hskip\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)\hskip\labelsep}%
   \liststrut[\displaystyle\frac /y]
\begin{tabenum}[a)]%
...
```

1) a) $z = \dfrac{x}{y}$; 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) $v = gt + \dfrac{g}{4}t$, g) $u = 2^{5x-3y+z}$.

h) $w = (v+7)^2 + (u-3)^2$; i) $5^x = \dfrac{4}{3}$; j) $z = (x+1)^2 + y^2$;

k) $2 + 5 + 8 + \ldots + (3n+2) = 155$, $n \in \mathrm{N}$; l) $t = 5u^2 + 8v^2$;

Note: The `\liststrut` not always works correctly.

1.3 The `subtabenum` environment: second level, variant I

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

```
\begin{tabenum}[\bfseries 1)]%
\item
\begin{subtabenum}[a)]%
\item
$z=\displaystyle\frac xy$;
\noitem
$2^x=9;$
\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
...
\end{subtabenum}
\end{tabenum}
```

1) a) $z = \dfrac{x}{y}$; b) $2^x = 9$; c) $3^{2x+3} = 4$. d) $z = 2x^2 + 4y^2$;

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

d) $w = (v+7)^2 + (u-3)^2$; e) $5^x = \dfrac{4}{3}$; f) $z = (x+1)^2 + y^2$;

g) $2 + 5 + 8 + \ldots + (3n+2) = 155$, $n \in \mathrm{N}$; h) $t = 5u^2 + 8v^2$;

Please note that `\hidewidth` skip is followed by the `\strut` command inside `subtabenum` environment: the skips at the "edges" of `tabular` columns or before `\\` command 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. Also the rows of sublist cannot break between pages.

\subtabenumitem   There is another variant for two-level tabulated list. If you use second option in
\subitem `tabenum` environment, you may use `\subtabenumitem`/`\subitem` commands for the second level[3].

    If you put `\subtabenumitem` (`\subitem`) after `\tabenumitem` (`\item`), you get extra space between two numbers, created by `\tabenumsep` skip. The `\negtabenumsep` command cancels this skip: the version 0.1c included this command inside the `\tabenumitem` definition.

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

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

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[3]If there are not second optional argument, these commands work like `\tabenumitem`/`\item`.

g) $w = (v+7)^2 + (u-3)^2$;   h) $5^x = \dfrac{4}{3}$;   i) $z = (x+1)^2 + y^2$;

j) $2+5+8+\ldots+(3n+2) = 155$, $n \in \mathbb{N}$;   k) $t = 5u^2 + 8v^2$;

There were used two commands $\backslash$startnumber and $\backslash$startsubnumber which set next start numbers for items of each of two levels[4]. The $\backslash$startnumber allows you to divide tabenum environment and restart with necessary counter. You may still use the traditional $\backslash$setcounter{enum..}{..} combination, if you know the level of your list and tabenum/subtabenum environments. For start of the new row from subitem, you need to use   1) the $\backslash$skipitem command to skip column, occupied by the "parent" label ($\backslash$tabenumitem) and   2) the $\backslash$negtabenumsep command to undo column separation. These two commands abbreviated by $\backslash$subtabrow command.

1.5   Placing the QED sign at the end of **tabenum** environment

When the tabenum environment is used inside proof environment (the amsthm package), the better way is to put QED at the end of last tabenum line. You may use the $\backslash$tabqedhere command:

Theorem 1. *You may put the QED sign inside the* tabenum *environment.*

Proof. Let's put our favorite tabenum environment inside the proof one, and at the end of it write the $\backslash$tabqedhere (or $\backslash$qedhere) command:

```
\begin{theorem}
 You may put the QED sign inside the \env{tabenum} environment.
\end{theorem}
\begin{proof}
 Let's put...
\begin{tabenum}[\bfseries 1)][a)]%
...
\subitem
$t=5u^2+8v^2$;\qedhere
\end{tabenum}
\end{proof}
```

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

g) $w = (v+7)^2 + (u-3)^2$;   h) $5^x = \dfrac{4}{3}$;   i) $z = (x+1)^2 + y^2$;

j) $2+5+8+\ldots+(3n+2) = 155$, $n \in \mathbb{N}$;   k) $t = 5u^2 + 8v^2$;   □

1.6   Restoring of **\item** as command from list environments

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

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[4]The $\backslash$startnumber command can be used inside any list environment.