

# Strands package

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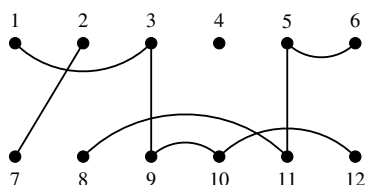
```
\usepackage[<options>]{strands}
```

## 1 The `\vpartition` macro

Use the macro `\vpartition` to draw a set partition in the partition monoid  $C_n$  as

```
\vpartition[<options>]{<sorted blocks>}
```

where `<sorted blocks>` are the blocks, separated by commas, entered as blocks of a set partition of  $\{\pm 1, \dots, \pm n\}$ . The positive numbers correspond to the dots above and the negative numbers correspond to the dots below. For instance:



```
\vpartition{{1,3,-3,-4,-6},{6,5,-5,-2},{-1,2}}
```

Note that the dots are connected in the order as the numbers appear on the blocks. So, if we change the position of numbers it will output a different representation.

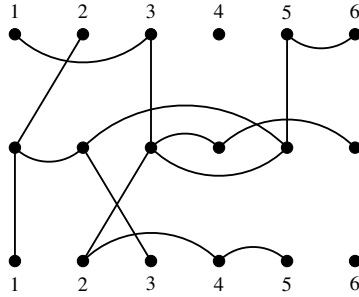
The options `<options>` are entered as `<option>=<value>` and defined as follows:

- `bend`: Integer number to manage the bend of brackets. Default value is 45.
- `bulleta`: Use 1 to draw bullets from 1 to  $n$  above, otherwise use 0. Default value is 1.
- `bulletb`: Use 1 to draw bullets from  $-1$  to  $-n$  below, otherwise use 0. Default value is 1.
- `floor`: Nonnegative float number setting where the picture starts to be drawn. So it starts at `floor*height`. Default value is 0.

- `font`: Nonnegative float number setting the size of the font labelling the dots. Default value is 0.7.
- `height`: Positive float number setting the height of the picture. Default value is 1.
- `labelver`: Space between dots and labels. Default value is 0.2.
- `labelhor`: Additional space between labels (only for signed labels). Default value is 0.03.
- `norma`: Positive float number to normalize the height above `floor` with other pictures. Default value is 0.
- `normb`: Negative float number to normalize the height below `floor` with other pictures. Default value is 0.
- `nstr`: Positive integer defining the number of strands. This value is used only if it is bigger than the self computed value.
- `reflect`: Use 1 to mirror the brackets connections vertically, otherwise use 0. Default value is 0.
- `rotate`: Integer number to rotate the picture. Default value is 0.
- `scale`: Positive float number to scale the picture. Default value is 1.
- `strwidth`: Positive float number to set the width of the strands. Default value is 0.7.
- `tkzpic`: Use 1 to add the `tikzpicture` environment automatically, otherwise use 0. Default value is 1. Note that options `rotate` and `scale` will not work if `tkzpic` is 0.
- `type`: Value in  $\{-1, 1, 2, 3, 4, 5\}$  to set the labels of the dots. Use  $-1$  to put only labels below from 1 to  $n$ . Use 0 to put no labels. Use 1 to put only labels above from 1 to  $n$ . Use 2 to put labels above and below from 1 to  $n$ . Use 3 to put labels from 1 to  $n$  above and labels from  $n + 1$  to  $2n$  below. Use 4 to put labels from 1 to  $n$  above and labels from  $1'$  to  $n'$  below. Use 5 to put signed labels,  $n$  must be even in this case.
- `width`: Positive float number to set the width between horizontal dots. Default value is 0.6.

Most of the options defined above can be set as global options in the `\usepackage` macro.

Below a more complex example:



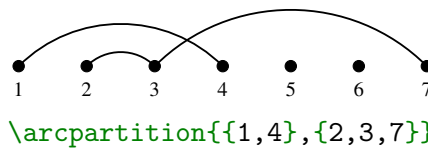
```
\begin{tikzpicture}[scale=1.5]
  \vpartition[
    bullb=0,
    floor=1,
    tkzpic=0,
    type=1
  ]{{1,3,-3,-4,-6},{6,5,-5,-2},{-1,2}}
  \vpartition[
    nstr=6,
    tkzpic=0,
    type=-1
  ]{{-1,1,2,-3},{5,3,-2,-4,-5}}
\end{tikzpicture}
```

### 1.1 The `\arcpartition` macro

Use the macro `\arcpartition` to draw the graph of a set partition of  $\{1, \dots, n\}$  as

```
\arcpartition[<options>]{<sorted blocks>}
```

where `<sorted blocks>` are the blocks, separated by commas. This macro is constructed from `\vpartition`, so its behavior is similar. For instance:



The options `<options>` come from `\vpartition`, so most of them are defined in the same way, these are: `bend`, `floor`, `font`, `labelver`, `lavelhor`, `norma`, `normb`,

rotate, scale, strwidth, tkzpic and width. However, the following options work different:

- bull: Use 1 to draw bullets from 1 to  $n$ . Otherwise use 0. Default value is 1.
- num: Positive integer defining the number of dots. This value is used only if it is bigger than the self computed value.
- type: Use 1 to put labels from 1 to  $n$ , otherwise use 0. Default value is 1.

Most of the options can be set as global options in the `\usepackage` macro.

## 2 The `\strands` macro

### Acknowledgements

The author was supported by the grant "Fondo de Apoyo a la Investigación" DIUA179-2020.

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