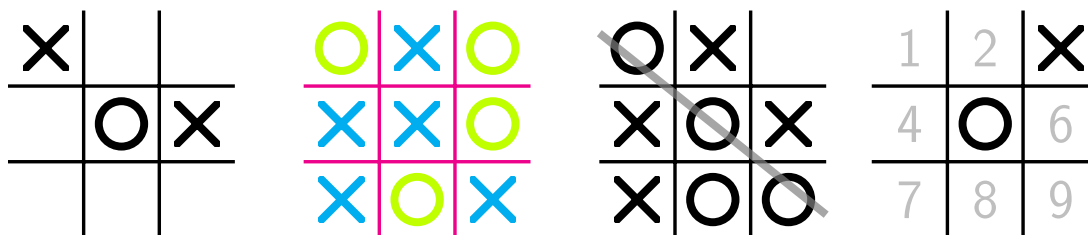


tictactoe v1.0

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Contents

1	Introduction	1
2	Drawing a basic board	1
3	Winning lines	2
4	Highlighting a move	3
5	Numbering the empty cells	3
6	○ and × symbols in text	3
7	Boards with labels (e.g. scores)	4
8	Customisation	7
8.1	Size	7
8.2	Colour	8
8.3	Different symbols	9
8.3.1	Letters that are not permitted, and how to permit them	9
8.4	○s and ×s and ○'s and ×'s	10
8.5	Non-American English command options	10
A	Command and related names used by this package	11
A.1	Counters	11
A.2	Commands	11
A.3	TikZ style names	11
A.4	Other	11
B	Implementation	12

1 Introduction

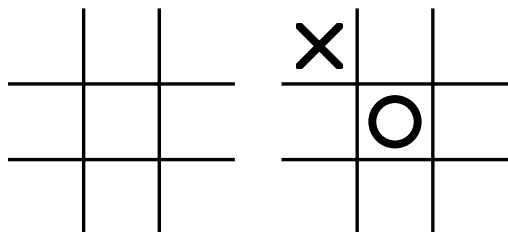
This package provides commands for drawing grids for the game known variously as tic-tac-toe*, Noughts and Crosses†, Xs and Os, and so on.

I have chosen the name `tictactoe` even though I would prefer something based on Noughts and Crosses as I think it is well-recognised and I think command names based on `\noughtsandcrosses` are too unwieldy. The package also provides an option to enable commands based on `\ox`, though I think this is quite short for a command name and am concerned about clashes.

2 Drawing a basic board

The basic command is `\tictactoe{grid positions}{winning line}`. The `grid positions` are a comma-separated list of nine items, any of which can be blank. The `winning line` is explained later; for now, since it can be blank we will leave it blank.

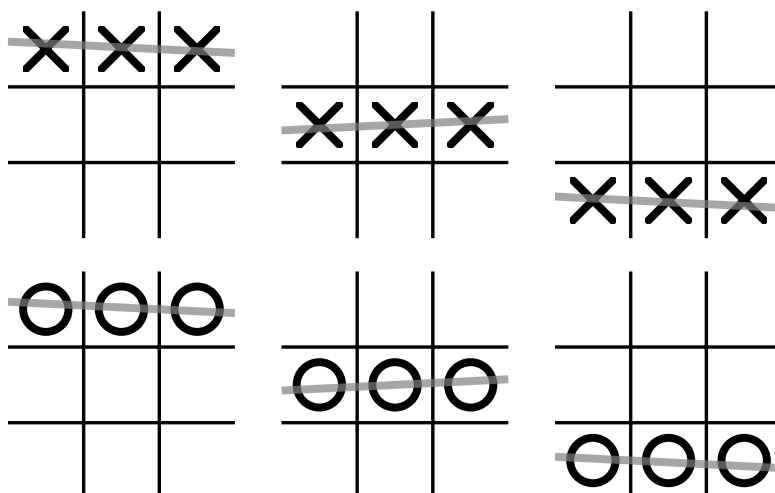
For example, to produce a blank board, use `\tictactoe{,,,,,,}{}` (left below). To put \bigcirc in one of the cells, put the letter ‘O’ in that position, and put ‘X’ for \times . For example, `\tictactoe{X,,,0,,,,}` produces the board on the right below.



3 Winning lines

The second input to the command is which line to mark as the winning line, if any. Winning lines are all a little askew just for the look of thing, I felt it looked odd to be straight through the centre of each cell, especially when drawing diagonally through a winning line of \times 's.

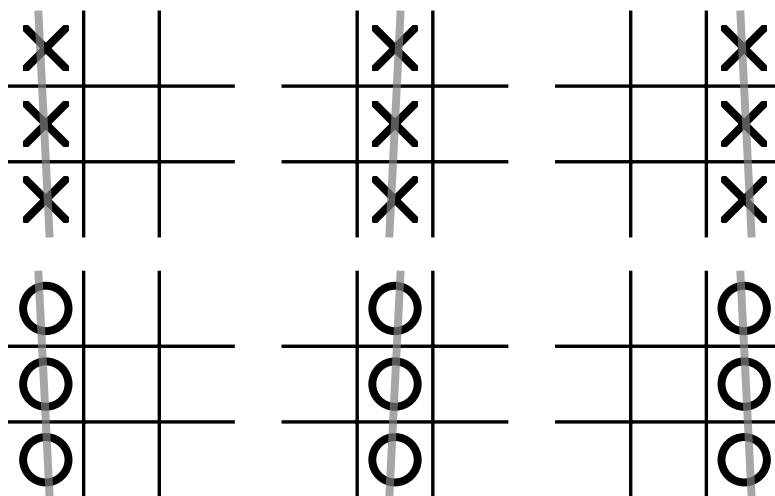
The rows are numbered 1, 2, and 3. For example the first board here is `\tictactoe{X,X,X,,,,,}{1}`.



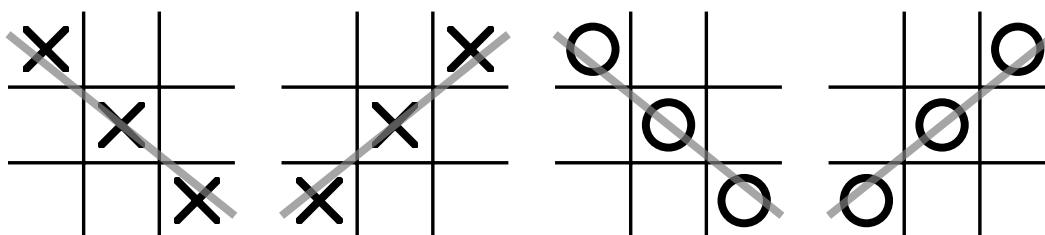
*I noticed Martin Gardner writes it ticktacktoe, and I learn from Wikipedia that Americans also spell it tick-tack-toe, tick-tat-toe, and tit-tat-toe.

†Alternatively, I'm sorry to report, Naughts and Crosses.

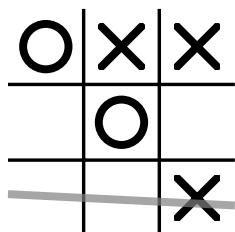
The columns are numbered 4, 5, and 6. For example the first board here is `\tictactoe{X,,X,,X,,}{4}`.



The diagonals are numbered 7 and 8. For example the first board here is `\tictactoe{X,,,X,,,}{7}`.

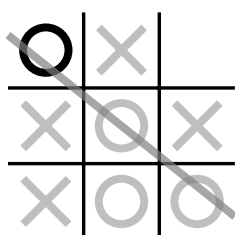


There is no restriction on which line can be marked, for example it does not need to hold three matching symbols. For example `\tictactoe{0,X,X,0,,,X}{3}` produces

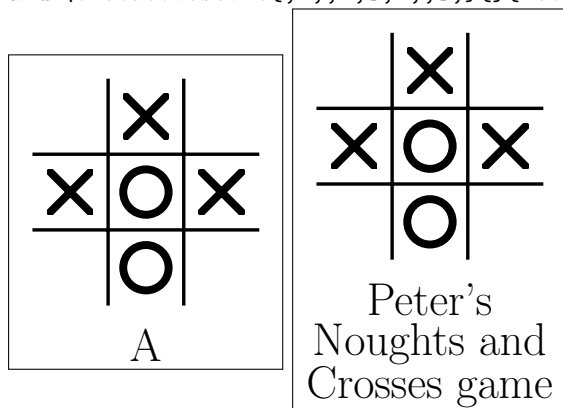


4 Highlighting a move

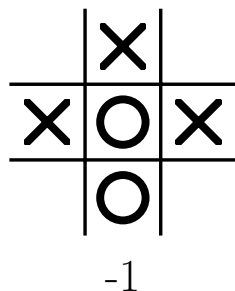
It is sometimes desirable to highlight the current move against the rest of the board. By default (see section 8.2 for colour options), the symbols produced by inputting 'X' and 'O' are black and those produced by 'x' and 'o' are light grey. For example, `\tictactoe{0,x,,x,o,x,x,o,o}{7}` produces



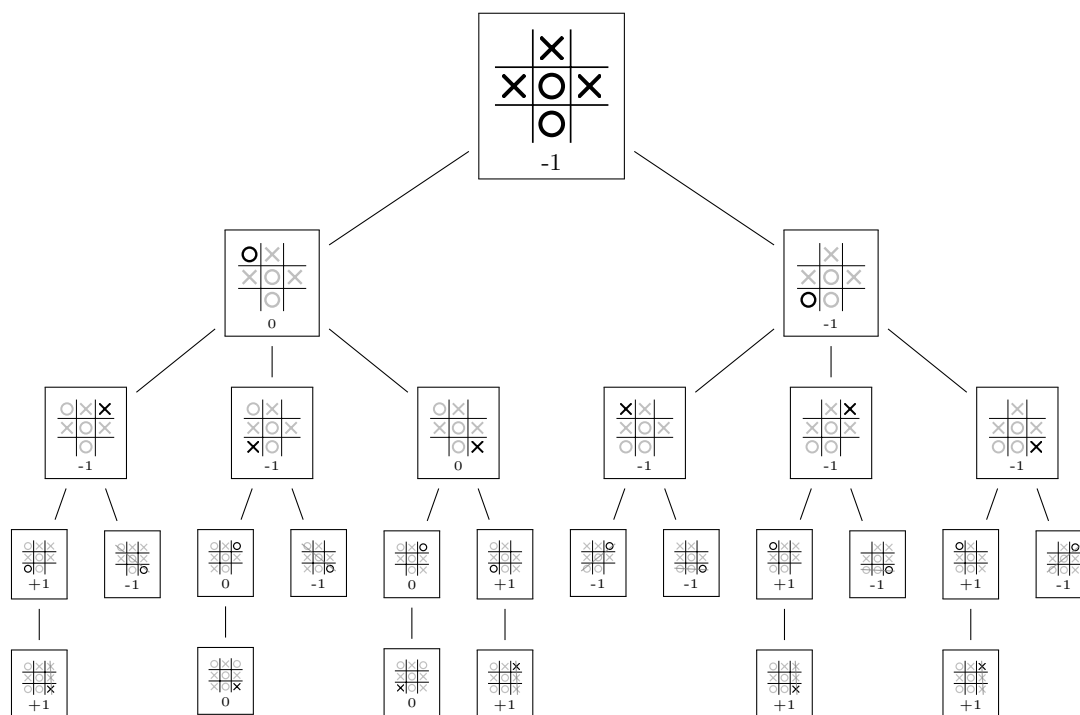
The label can in principle be any text, for example `\tictactoescore{X,,X,O,X,,0,}{A}` and `\tictactoescore{X,,X,O,X,,0,}{Peter's Noughts and Crosses game}` produce



By default here there is a box around the grid and corresponding score to associate them. It is possible to draw these without the surrounding box, for example using `\tictactoescorenobox{X,,X,O,X,,0,}{-1}` produces



One possible use for boards with scores is in a game tree using the `forest` package. Width is of course an issue, here the nodes further down the tree are sized smaller accordingly (see section 8.1).



The code that produced this diagram is below.

```

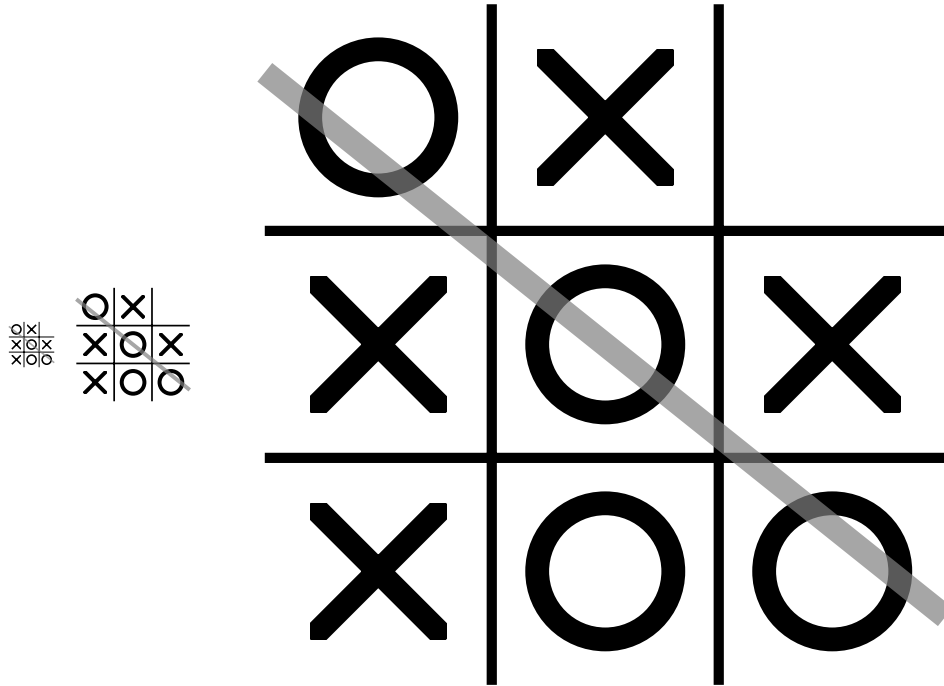
\begin{forest}
[{\tictactoescore[0.5]{,X,,X,0,X,,0,}{-1}}
  [ {\tictactoescore[0.3]{0,x,,x,o,x,,o,}{0}}
    [ {\tictactoescore[0.25]{o,x,X,x,o,x,,o,}{-1}}
      [ {\tictactoescore[0.1]{o,x,x,x,o,x,0,o,}{+1}}
        [ {\tictactoescore[0.1]{o,x,x,x,o,x,o,o,X}{6}{+1}}
        ]
      ]
      [ {\tictactoescore[0.1]{o,x,x,x,o,x,,o,0}{7}{-1}}
      ]
    ]
    [ {\tictactoescore[0.25]{o,x,,x,o,x,X,o,}{-1}}
      [ {\tictactoescore[0.1]{o,x,0,x,o,x,x,o,}{0}}
        [ {\tictactoescore[0.1]{o,x,o,x,o,x,x,o,X}{0}}
        ]
      ]
      [ {\tictactoescore[0.1]{o,x,,x,o,x,x,o,0}{7}{-1}}
      ]
    ]
    [ {\tictactoescore[0.25]{o,x,,x,o,x,,o,X}{0}}
      [ {\tictactoescore[0.1]{o,x,0,x,o,x,,o,x}{0}}
        [ {\tictactoescore[0.1]{o,x,o,x,o,x,X,o,x}{0}}
        ]
      ]
      [ {\tictactoescore[0.1]{o,x,,x,o,x,0,o,x}{+1}}
        [ {\tictactoescore[0.1]{o,x,X,x,o,x,o,o,x}{6}{+1}}
        ]
      ]
    ]
  ]
  [ {\tictactoescore[0.3]{,x,,x,o,x,0,o,}{-1}}
    [ {\tictactoescore[0.25]{X,x,,x,o,x,o,o,}{-1}}
      [ {\tictactoescore[0.1]{x,x,0,x,o,x,o,o,}{8}{-1}}
        [ {\tictactoescore[0.1]{x,x,,x,o,x,o,o,}{3}{-1}}
        ]
      ]
      [ {\tictactoescore[0.25]{,x,X,x,o,x,o,o,}{-1}}
        [ {\tictactoescore[0.1]{0,x,x,x,o,x,o,o,}{+1}}
          [ {\tictactoescore[0.1]{o,x,x,x,o,x,o,o,X}{6}{+1}}
          ]
        ]
        [ {\tictactoescore[0.1]{,x,x,x,o,x,o,o,0}{3}{-1}}
        ]
      ]
    ]
    [ {\tictactoescore[0.25]{,x,,x,o,x,o,o,X}{-1}}
      [ {\tictactoescore[0.1]{0,x,,x,o,x,o,o,x}{+1}}
        [ {\tictactoescore[0.1]{o,x,X,x,o,x,o,o,x}{6}{+1}}
        ]
      ]
      [ {\tictactoescore[0.1]{,x,0,x,o,x,o,o,x}{8}{-1}}
      ]
    ]
  ]
]
\end{forest}

```


8 Customisation

8.1 Size

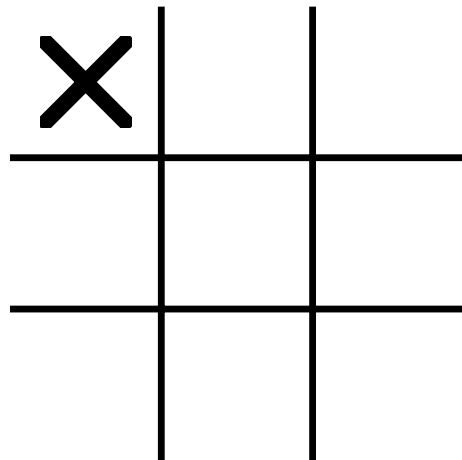
Different sizes are possible by passing a scale factor when calling commands. For example, `\tictactoe[scale]{0,X,,X,0,X,X,0,0}{7}` produces, for 0.2, 0.5, 3,



It is possible to pass a scale factor to `\tictactoe`, `\tictactoescore`, and `\tictactoescorenobox`. It is also possible to pass a scale factor to `\nought` and `\cross`, but note these do not align[‡], meaning for example `\cross[2]` doesn't produce a cross as big as a cross in `\tictactoe[2]{X,,,,,,,,}{}`.

Here's `\cross[2]`: 

Here's `\tictactoe[2]{X,,,,,,,,}{}`:



[‡]This is because `\tictactoe` etc. are based on the default TikZ unit (cm) so they don't respond when the font size changes, while `\nought` and `\cross` are based on em, so they do. Thus `\nought` and `\cross` have dimensions 1em, and scaling this doesn't scale as quickly as 1cm.

8.2 Colour

Four colours are defined by commands.

```
\tictocfullcol      full colour pieces
\tictocfaintcol    faint colour pieces
\tictocwincol      winning lines
\tictocgridlinescol  gridlines
```

The default colours are defined like this.

```
\newcommand{\tictocfullcol}{black}
\newcommand{\tictocfaintcol}{lightgray}
\newcommand{\tictocwincol}{gray}
\newcommand{\tictocgridlinescol}{black}
```

It is therefore possible to change these by redefining these commands. For example

```
\renewcommand{\tictocfullcol}{lime}
\renewcommand{\tictocfaintcol}{cyan}
\renewcommand{\tictocwincol}{yellow}
\renewcommand{\tictocgridlinescol}{magenta}
\tictactoe{X,x,0,o,n,X,X,X,X}{3}
```

produces

X	X	O
O	5	X
X	X	X

As well as just changing the colouring, one possible application is to colour **O**'s and **X**'s in different colours, if you then use uppercase for one and lowercase for the other, and if you don't wish to highlight a move. For example

```
\renewcommand{\tictocfullcol}{red}
\renewcommand{\tictocfaintcol}{blue}
\tictactoe{o,X,o,X,X,o,X,o,X}{}
```

produces

O	X	O
X	X	O
X	O	X

8.3 Different symbols

The commands like `\tictactoe` expect input to be one of the characters ‘X’, ‘x’, ‘O’, ‘o’, or ‘n’. As a fallback (and not really intended as a feature), if the input is none of these, it tries to place the input into the cell directly. For example, the first of these is produced by `\tictactoe{\#,*,\&,\%,5,;,,:=,!}{}`.

#	*	&
%	5	;
:	=	!

		Z
	Y	
?		

corner	edge	corner
edge	centre	edge
corner	edge	corner

8.3.1 Letters that are not permitted, and how to permit them

If you want to put a standard letter ‘X’, ‘x’, ‘O’, ‘o’, or ‘n’ in the grid, you cannot because the package will draw its own symbol or number instead. However you can get around this by redefining commands.

For example, input ‘X’ is tested against the value of `\tictacX` and if it matches, it draws a cross. (And there are similar commands for the other inputs.) If after loading `tictactoe` you redefine `\tictacX` to some other letter, then your letter becomes the trigger for drawing a cross and you can put an ‘X’ in the grid without obstruction. For example, the code below redefines these commands to use ‘P’, ‘p’, ‘Q’, ‘q’, and ‘r’, allowing ‘X’, ‘x’, ‘O’, ‘o’, and ‘n’ in the grid.

```

\documentclass{article}
\usepackage{tictactoe}
\renewcommand{\tictacX}{P}
\renewcommand{\tictacx}{p}
\renewcommand{\tictacO}{Q}
\renewcommand{\tictaco}{q}
\renewcommand{\tictacn}{r}
\begin{document}
  \tictactoe{X,O,x,o,n,X,X,X}{3}
  \tictactoe{P,p,Q,q,r,P,P,P}{3}
\end{document}

```

This will produce

X	x	O	X	X	O
o	n	X	O	5	X
X	X	X	X	X	X

To restore the default values use

```
\renewcommand{\tictacX}{X}
\renewcommand{\tictacx}{x}
\renewcommand{\tictacO}{O}
\renewcommand{\tictaco}{o}
\renewcommand{\tictacn}{n}
```

8.4 Os and Xs and O's and X's

The commands `\nought` and `\cross` use the `xspace` package to place a space after them or not depending on context. For example in the code

Place in the grid either `\nought` or `\cross`.

it knows to put a space after the `O` but not after the `X`.

One issue with this is that sometimes you do want another character straight after the command. Sometimes this works fine, for example if you want “O’s”, you simply use `\nought's`. However, a letter after the symbol is more problematic: `\noughts` is not valid, and `\nought s` produces a space, like “O s”. The solution is to use an empty set of braces, for example `\nought{ }s` produces Os.

8.5 Non-American English command options

Instead of `\tictactoe`, `\tictactoescore`, and `\tictactoescorenobox`, you can use `\ox`, `\oxscore`, and `\oxscorenobox` if you enable the `ox` option when loading the package.

```
\usepackage[ox]{tictactoe}
```

These are used in exactly the same way, including optional scale factor (in fact, the `\tictactoe` versions are still defined, just the `\ox` commands pass your input onto their American cousins). For example, `\ox{0,x,,x,o,x,x,o,o}{7}` produces (provided the `ox` option was loaded)

O	X	
X	O	X
X	O	O

If you get a clash because `\ox` is already used for something else, simply remove the `[ox]` option, grit your teeth, and use `\tictactoe`.

A Command and related names used by this package

I tried to name non-user commands, counters, and TikZ style with the prefix `tictac`, to hopefully avoid clashes. Details below.

A.1 Counters

```
tictacrowmakercounter  
tictacrowmakermax  
tictaccellcounter
```

A.2 Commands

```
\tictacX  
\tictacx  
\tictac0  
\tictaco  
\tictacn  
\tictacscale  
\tictocfullcol  
\tictocfaintcol  
\tictocwincol  
\tictocgridlinescol  
\tictaccellmaker  
\tictaccellmarker  
\tictacrowmaker  
\tictactoeogrid  
\cross  
\nought  
\tictactoe  
\tictactoescore  
\tictactoescorenobox  
\tictacscorewidth  
\tictacfontsize  
\tictacfontspacing  
\ox  
\oxscore  
\oxscorenobox
```

A.3 TikZ style names

Within TikZ, the following styles are defined:

```
tictacfullcirc  
tictacfullcross  
tictacfaintcirc  
tictacfaintcross  
tictacwin
```

A.4 Other

The package also creates an `\iftictactoeox`.

B Implementation

```
(*tictactoe)
\ProvidesPackage{tictactoe}[2024/06/20 tictactoe 1.0]

% dependencies
\RequirePackage{tikz}
\RequirePackage{xspace}

\makeatletter
\@ifundefined{c@tictacrowmakercounter}{}
{\PackageWarning{tictactoe}{counter `tictacrowmakercounter' already defined}}
\@ifundefined{c@tictacrowmakermax}{}
{\PackageWarning{tictactoe}{counter `tictacrowmakermax' already defined}}
\@ifundefined{c@tictaccellcounter}{}
{\PackageWarning{tictactoe}{counter `tictaccellcounter' already defined}}
\@ifundefined{tictacX}{}
{\PackageWarning{tictactoe}{command `tictacX' already defined}}
\@ifundefined{tictacx}{}
{\PackageWarning{tictactoe}{command `tictacx' already defined}}
\@ifundefined{tictacO}{}
{\PackageWarning{tictactoe}{command `tictacO' already defined}}
\@ifundefined{tictaco}{}
{\PackageWarning{tictactoe}{command `tictaco' already defined}}
\@ifundefined{tictacn}{}
{\PackageWarning{tictactoe}{command `tictacn' already defined}}
\@ifundefined{tictacscale}{}
{\PackageWarning{tictactoe}{command `tictacscale' already defined}}
\@ifundefined{tictocfullcol}{}
{\PackageWarning{tictactoe}{command `tictocfullcol' already defined}}
\@ifundefined{tictocfaintcol}{}
{\PackageWarning{tictactoe}{command `tictocfaintcol' already defined}}
\@ifundefined{tictocwincol}{}
{\PackageWarning{tictactoe}{command `tictocwincol' already defined}}
\@ifundefined{tictocgridlinescol}{}
{\PackageWarning{tictactoe}{command `tictocgridlinescol' already defined}}
\@ifundefined{tictaccellmaker}{}
{\PackageWarning{tictactoe}{command `tictaccellmaker' already defined}}
\@ifundefined{tictaccellmarker}{}
{\PackageWarning{tictactoe}{command `tictaccellmarker' already defined}}
\@ifundefined{tictacrowmaker}{}
{\PackageWarning{tictactoe}{command `tictacrowmaker' already defined}}
\@ifundefined{tictactoegrid}{}
{\PackageWarning{tictactoe}{command `tictactoegrid' already defined}}
\@ifundefined{cross}{}
{\PackageWarning{tictactoe}{command `cross' already defined}}
\@ifundefined{nought}{}
{\PackageWarning{tictactoe}{command `nought' already defined}}
\@ifundefined{tictactoe}{}
{\PackageWarning{tictactoe}{command `tictactoe' already defined}}
\@ifundefined{tictactoescore}{}
{\PackageWarning{tictactoe}{command `tictactoescore' already defined}}
\@ifundefined{tictactoescorenobox}{}
{\PackageWarning{tictactoe}{command `tictactoescorenobox' already defined}}
\@ifundefined{tictacscorewidth}{}
{\PackageWarning{tictactoe}{command `tictacscorewidth' already defined}}
\@ifundefined{tictacfontsize}{}
{\PackageWarning{tictactoe}{command `tictacfontsize' already defined}}
```

```

\@ifundefined{tictacfontspacing}{}
{\PackageWarning{tictactoe}{command `tictacfontspacing' already defined}}
\makeatother

% non-US spelling option
\newif\iftictactoeox
\tictactoeoxfalse
\DeclareOption{ox}{\tictactoeoxtrue}
\ProcessOptions\relax
\iftictactoeox % add the extra options
\makeatletter
\@ifundefined{ox}{}{\PackageWarning{tictactoe}{command `ox' already defined}}
\@ifundefined{oxscore}{}{\PackageWarning{tictactoe}{command `oxscore' already defined}}
\@ifundefined{oxscorenobox}{}{\PackageWarning{tictactoe}{command `oxscorenobox' already defined}}
\makeatother
\newcommand{\ox}[3][1]{\tictactoe[#1]{#2}{#3}}
\newcommand{\oxscore}[4][1]{\tictactoescore[#1]{#2}{#3}{#4}}
\newcommand{\oxscorenobox}[4][1]{\tictactoescorenobox[#1]{#2}{#3}{#4}}
\fi

% for tracking position while drawing grids
\newcounter{tictacrowmakercounter}
\newcounter{tictacrowmakermax}
\newcounter{tictacellcounter}

% these are the symbols that trigger drawing in the grid
\newcommand{\tictacX}{X} % full cross
\newcommand{\tictacx}{x} % faint cross
\newcommand{\tictacO}{O} % full nought
\newcommand{\tictaco}{o} % faint nought
\newcommand{\tictacn}{n} % number of the cell

% scale factor and sizes (given values by user commands)
\newcommand{\tictacscale}{}
\newcommand{\tictacscorewidth}{}
\newcommand{\tictacfontsize}{}

% colours
\newcommand{\tictocfullcol}{black}
\newcommand{\tictocfaintcol}{lightgray}
\newcommand{\tictocwincol}{gray}
\newcommand{\tictocgridlinescol}{black}

% internal command: draws a cell with a little picture of a nought or a cross
\newcommand{\tictacellmaker}[2]{
  \setcounter{tictacellcounter}{#1}
  \if\thetictacellcounter0
    \path (0.5*\tictacscale*0.667,2.5*\tictacscale*0.667) pic{#2};
  \else\if\thetictacellcounter1
    \path (1.5*\tictacscale*0.667,2.5*\tictacscale*0.667) pic{#2};
  \else\if\thetictacellcounter2
    \path (2.5*\tictacscale*0.667,2.5*\tictacscale*0.667) pic{#2};
  \else\if\thetictacellcounter3
    \path (0.5*\tictacscale*0.667,1.5*\tictacscale*0.667) pic{#2};
  \else\if\thetictacellcounter4
    \path (1.5*\tictacscale*0.667,1.5*\tictacscale*0.667) pic{#2};
  \else\if\thetictacellcounter5
    \path (2.5*\tictacscale*0.667,1.5*\tictacscale*0.667) pic{#2};

```

```

\else\if\thetictacellcounter6
\path (0.5*\tictacscale*0.667,0.5*\tictacscale*0.667) pic{#2};
\else\if\thetictacellcounter7
\path (1.5*\tictacscale*0.667,0.5*\tictacscale*0.667) pic{#2};
\else\if\thetictacellcounter8
\path (2.5*\tictacscale*0.667,0.5*\tictacscale*0.667) pic{#2};
\fi\fi\fi\fi\fi\fi\fi\fi\fi
}

% internal command: draws a cell as a node with text in
\newcommand{\tictacellmarker}[4][1]{
\pgfmathsetmacro{\tictacfontsize}{#1*#1*20}
\setcounter{tictacellcounter}{#3}
\if\thetictacellcounter0
\node[#2] at (0.5*\tictacscale*0.667,2.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter1
\node[#2] at (1.5*\tictacscale*0.667,2.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter2
\node[#2] at (2.5*\tictacscale*0.667,2.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter3
\node[#2] at (0.5*\tictacscale*0.667,1.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter4
\node[#2] at (1.5*\tictacscale*0.667,1.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter5
\node[#2] at (2.5*\tictacscale*0.667,1.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter6
\node[#2] at (0.5*\tictacscale*0.667,0.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter7
\node[#2] at (1.5*\tictacscale*0.667,0.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\else\if\thetictacellcounter8
\node[#2] at (2.5*\tictacscale*0.667,0.5*\tictacscale*0.667)
{\sffamily\fontsize{\tictacfontsize pt}{0pt}\selectfont #4};
\fi\fi\fi\fi\fi\fi\fi\fi\fi
}

% internal command: draws a row of three cells based on #3 starting from position #2
\newcommand{\tictacrowmaker}[3][1]{%
\setcounter{tictacrowmakercounter}{#2}
\setcounter{tictacrowmakermax}{#2}
\addtocounter{tictacrowmakermax}{2} % start + 2 makes three
\foreach \l [count = \i from 0] in {#3} {
\if\i\thetictacrowmakercounter
\if\l\tictacX % full cross
\tictacellmaker{\i}{tictacfullcross};
\else\if\l\tictac0 % full nought
\tictacellmaker{\i}{tictacfullcirc};
\else\if\l\tictaco % faint nought
\tictacellmaker{\i}{tictacfaintcirc};
\else\if\l\tictacx % faint cross
\tictacellmaker{\i}{tictacfaintcross};

```

```

\else\if\l\tictacn % number of the cell
\tictacellmarker[#1]{\tictocfaintcol}{i}{\pgfmathparse{int(\i+1)}\pgfmathresult}
\else % just try to draw the symbol that has been provided as input
\tictacellmarker[#1]{\tictocfullcol}{i}{\l}
\fi\fi\fi\fi\fi
\if\thetictacrowmakercounter\thetictacrowmakermax\else
\addtocounter{tictacrowmakercounter}{1} % if we haven't done three, keep outputting
\fi
\fi
}
}

% internal command: draw a 3x3 grid
\newcommand{\tictactoegrid}[3][1]
{%
\renewcommand{\tictacscale}{#1*1.5}%
\begin{tikzpicture}[line width=\tictacscale*0.07 cm]
\tikzset{ % adapted from https://tex.stackexchange.com/a/634705
tictacfullcirc/.pic={\draw[\tictocfullcol] circle (0.2*\tictacscale);},
tictacfullcross/.pic={\clip (-0.2*\tictacscale,-0.2*\tictacscale) rectangle
(0.2*\tictacscale,0.2*\tictacscale);
\draw[\tictocfullcol] (-0.2*\tictacscale,-0.2*\tictacscale) --
(0.2*\tictacscale,0.2*\tictacscale) (-0.2*\tictacscale,0.2*\tictacscale) --
(0.2*\tictacscale,-0.2*\tictacscale);},
tictacfaintcirc/.pic={\draw[\tictocfaintcol] circle (0.2*\tictacscale);},
tictacfaintcross/.pic={\draw[\tictocfaintcol] (-0.2*\tictacscale,-0.2*\tictacscale) --
(0.2*\tictacscale,0.2*\tictacscale) (-0.2*\tictacscale,0.2*\tictacscale) --
(0.2*\tictacscale,-0.2*\tictacscale);},
tictacwin/.style={\tictocwincol,opacity=0.7,line width=\tictacscale*0.07 cm} % winning line
}

% grid
\phantom{\draw (-0.1*\tictacscale,-0.1*\tictacscale) rectangle
(2.1*\tictacscale,2.1*\tictacscale);} % make each pic the same size
\foreach \i in {1,2}{\draw[line width=\tictacscale*0.03 cm,\tictocgridlinescol]
(\i*\tictacscale*0.667,0) -- (\i*\tictacscale*0.667,\tictacscale*2)
(0,\i*\tictacscale*0.667) -- (\tictacscale*2,\i*\tictacscale*0.667);}

% cells
\foreach \y in {0,3,6}{
\tictacrowmaker[#1]{\y}{#2}
}

% winning lines
\foreach \l in {#3}
{
\if\l1
\draw[tictacwin] (0,\tictacscale*1.733) -- (2*\tictacscale,\tictacscale*1.633);
\else\if\l2
\draw[tictacwin] (0,\tictacscale*0.95) -- (2*\tictacscale,\tictacscale*1.05);
\else\if\l3
\draw[tictacwin] (0,\tictacscale*0.367) -- (2*\tictacscale,\tictacscale*0.267);
\else\if\l4
\draw[tictacwin] (\tictacscale*0.267,2*\tictacscale) -- (\tictacscale*0.367,0);
\else\if\l5
\draw[tictacwin] (\tictacscale*1.05,2*\tictacscale) -- (\tictacscale*0.95,0);
\else\if\l6
\draw[tictacwin] (\tictacscale*1.633,2*\tictacscale) -- (\tictacscale*1.733,0);

```

```

        \else\if\l7
        \draw[tictacwin] (0,1.8*\tictacscale) -- (2*\tictacscale,0.2*\tictacscale);
        \else\if\l8
        \draw[tictacwin] (0,0.2*\tictacscale) -- (2*\tictacscale,1.8*\tictacscale);
        \fi\fi\fi\fi\fi\fi\fi\fi\fi
    }
    \end{tikzpicture}%
}

% user commands: nought and cross in text
\newcommand{\cross}[1][1]{%
    \renewcommand{\tictacscale}{#1}\begin{tikzpicture}[line width=\tictacscale*0.12 em, baseline]
    \clip (-0.33*\tictacscale em,0) rectangle (0.33*\tictacscale em,0.66*\tictacscale em);
    \draw[\tictocfullcol] (-0.33*\tictacscale em,0) -- (0.33*\tictacscale em,0.66*\tictacscale em)
    (-0.33*\tictacscale em,0.66*\tictacscale em) -- (0.33*\tictacscale em,0);
    \end{tikzpicture}\xspace}
\newcommand{\nought}[1][1]{%
    \renewcommand{\tictacscale}{#1}\begin{tikzpicture}[line width=\tictacscale*0.12 em, baseline]
    \draw[\tictocfullcol] (0,0.33*\tictacscale em) circle (0.33*\tictacscale em);
    \end{tikzpicture}\xspace}

% user command: draw a grid
\newcommand{\tictactoe}[3][1]{%
    \pgfmathsetmacro{\tictacscorewidth}{#1*3.5}%
    \begin{minipage}{\tictacscorewidth cm}\centering
        \tictactoegrid[#1]{#2}{#3}
    \end{minipage}%
}

% user command: draw a grid with a number underneath in a box
\newcommand{\tictactoescore}[4][1]{%
    \pgfmathsetmacro{\tictacscorewidth}{#1*3.4}%
    \pgfmathsetmacro{\tictacfontsize}{#1*18}%
    \pgfmathsetmacro{\tictacfontspacing}{#1*15}%
    \fbox{\begin{minipage}{\tictacscorewidth cm}\centering
        \tictactoegrid[#1]{#2}{#3}\
        \fontsize{\tictacfontsize pt}{\tictacfontspacing pt}\selectfont #4
    \end{minipage}}%
}

% user command: draw a grid with a number underneath but no box
\newcommand{\tictactoescorenobox}[4][1]{%
    \pgfmathsetmacro{\tictacscorewidth}{#1*3.4}%
    \pgfmathsetmacro{\tictacfontsize}{#1*18}%
    \pgfmathsetmacro{\tictacfontspacing}{#1*15}%
    \begin{minipage}{\tictacscorewidth cm}\centering
        \tictactoegrid[#1]{#2}{#3}\
        \fontsize{\tictacfontsize pt}{\tictacfontspacing pt}\selectfont #4
    \end{minipage}%
}
</tictactoe)

```