THE worksheet DOCUMENT CLASS
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Name:

The document class `worksheet` is designed for formatting problems and solutions using the `tcolorbox` package. It supports formatting a problems-only and solutions-included document from a single source file. The `solutionbox` environment is for blank solution space, while the `solution` environment is for the actual solutions.

1 Basic commands

The main environments are `problem` and `solution`. Standard `tcolorbox` options, like `height = 5cm` or `height fill` can be passed to the tcolorbox.

Typically one would have a `problem` environment followed by a `solutionbox` environment followed by a `solution` environment. Only one of the latter two will be displayed, according to whether the `solutions` document option is invoked (that is `\documentclass[solutions]{worksheet}` will show solutions, while `\documentclass[]{worksheet}` will show empty boxes).

```
\begin{problem}
  $\vdots$
\end{problem}
```

Problem 1

$\vdots$

```
\begin{solution}[height = 5cm]
  $\vdots$
\end{solution}
```

Solution

$\vdots$

Equations, like (1.1) below, are numbered on a per-problem basis.

$$\int \frac{1}{1+x^2}\,\mathrm{d}x = \arctan x. \tag{1.1}$$

You can put a final answer box in the lower right-hand corner with

```
\finalanswer[$\frac{5}{2}$]
% or
\finalanswer[$\frac{5}{2}$][3cm][4cm]
```

or, for an empty final answer box, just `\finalanswer`. The macro `\solfinalanswer` gives a height-filling empty solution box with an empty final answer box.

2 Header commands

The header is produced with the `\header` command. A name can be included via `\headerwithname`, which takes two arguments: the header content and the width of the name box. So the header above was produced with

```
\headerwithname{
    The \texttt{worksheet} document class \\
    Samuel S.\ Watson \\ \today
  }{
    3 cm
  }
```

3 Other commands

We can also make a problem using the `\pb` shortcut

```
\pb{Another example problem}
```

Problem 2

Another example problem

Likewise, we can produce a solutionbox using `\sol`, which takes an optional argument of tcolorbox options, like `height = 5cm`.

We can put two problems side by side using the `problempair` environment (in which one must place two `problem` environments) or using `twoproblems`.

```
\twoproblems{first problem contents}{second problem contents}
```

Problem 3

first problem contents

Problem 4

second problem contents

We can also put two empty solution boxes side by side. The argument is any list of `tcolorbox` options.

```
\twosolutions{height = 5cm}
```

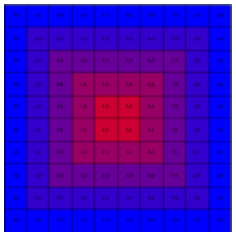
Solution

Solution

4 Inset figures

The `wrapfigure` package doesn't play so nicely with tcolorboxes. But `worksheet.cls` has its own `insetfigure` command which juxtaposes boxes containing its first and second arguments, with alignment specified by the optional third argument (`c` for center, `t` for top, and `b` for bottom, `t` by default) and spacing specified by the optional fourth argument (`16pt` by default). Here's an example:

```
\insetfigure{
  \lipsum[1]
}{
  \includegraphics[width=3cm]{example-grid-100x100pt}
}
\lipsum[2-3]
```



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5 Solutions

The accompanying Python script `processsolutions.py` can be used to simultaneously produce a pdf with solutions and one without. The only caveat here is that the square brackets in the `documentclass` command must be present, even if they're empty.

6 Julia integration

The `pythontex` package can be used to weave Julia code into the worksheets. Combined with SymPy, which can be accessed from Julia, this can be pretty powerful. For example:

```
\begin{jlcode}
  A = rand(-5:5,5,10)
  x = rand(-5:5,10)
\end{jlcode}

\[
  \jltex{A} \jltex{x} = \jltex{A*x}.
\]
```

$$\begin{bmatrix} -2 & -3 & 5 & 0 & -3 & -4 & -5 & -5 & 5 & -5 \\ -5 & 3 & -3 & 2 & -2 & 2 & -3 & -4 & -5 & -2 \\ 2 & 0 & 4 & 5 & 4 & -3 & 0 & 2 & -5 & -2 \\ 5 & -1 & -1 & -5 & 4 & -1 & -5 & 4 & 3 & 2 \\ 4 & 0 & 4 & 1 & 3 & 4 & -2 & 4 & 4 & -5 \end{bmatrix} \begin{bmatrix} -2 \\ -3 \\ -2 \\ -3 \\ 5 \\ -4 \\ 0 \\ 0 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 4 \\ -24 \\ -2 \\ 39 \\ -21 \end{bmatrix}.$$

```
\begin{jlcode}
  I = Integral(exp(x^2),x)
\end{jlcode}
```

```
\[
  \jltex{I} = \jltex{doit(I)}.
\]
```

$$\int e^{x^2}\,dx = \frac{\sqrt{\pi}}{2}\,\operatorname{erfi}(x).$$

The Julia function `p`, which simply returns its argument in string form, also increments a global Julia variable `POINTS`, which can be used to keep a running total of the points assigned so far.

Problem 5 (5 points)

This is the first problem.

Problem 6 (8 points)

This is the second problem.

Total points so far: 13

You can use `Plots.jl` with its `pgfplots` backend to generate figures which can then be included.