Instructions for Using the SAT TEX Macros

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Abstract. A good abstract consists of a single paragraph describing the main results of the paper. You may use mathematics in the abstract, but it is better not to put too many symbols into the abstract.

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1 Introduction

We would like all authors to follow some set of standards for layout and style. The purpose of this document is to explain how to use the plain TEX macro file `satmacros.tex` to prepare your contribution. One way to learn how to use these macros is to look at the TEX file `instruct.tex` which was used to generate this document. For those in a hurry, just obtain a copy of the file `textemplate.tex` from the page `http://www.math.technion.ac.il/sat/authors.html`, rename it, and fill in the details.

If you are a LaTEX user, simply follow the instructions embedded in the LaTEX template `latextemplate.tex` obtainable from `http://www.math.technion.ac.il/sat/authors.html`.

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2 Organization

We recommend that you organize your paper into sections. These sections will be automatically numbered. To create section headings, use the `\sect` macro. If your section heading does not fit on one line, use `||` to indicate suitable linebreaks in the heading. Do not leave a blank line between the section heading and the first line of text. A blank line indents the first paragraph in the section. Each major word in the section heading (other than words like *a, and, the, to, with*, etc.) should be capitalized. Do not include a period at the end of the section heading. Subsections can be created with `\subsect` and `\fsubsect`. The latter is for use immediately after the start of a section and simply leaves a little less space.

The command `\remember{\the\sectionnum}{...}` remembers the current section number in such a way that you can refer to it at any point by the command `\recall{...}`.

3 Proclamations

Definitions, Lemmas, Theorems, and Propositions are examples of proclamations. You create them using the macro `\proclaim`. This sets the title in boldface and the body of the object in a slanted font as, for example, in the following.

Definition 1. *Let $\mathcal{P}$ be a finite subset of $\mathbb{R}^2$. A subset $\mathcal{T}$ of $\mathcal{P}^3$ is called a* triangulation *of $\mathcal{P}$ provided that*

(1) *for each $t \in \mathcal{T}$, the points t_1, t_2, t_3 are the vertices of a proper triangle, denoted T_t;*

(2) *each such triangle T_t contains no points from $\mathcal{P}$ other than its vertices.*

Theorem 2. *Given any point set $\mathcal{P}$, there always exists at least one optimal triangulation. Moreover, every optimal triangulation is locally optimal provided*

$$n = \begin{cases} 3, & \text{if } m \text{ is odd,} \\ 0, & \text{otherwise.} \end{cases}$$

Proof: The `\proclaim` macro was used to state both the definition and the theorem. If you are not giving a proof, end your theorem with `\nopf`, which at the moment is just a `medskip`. Otherwise, leave a blank line and use `\pf` to begin the proof. In stating this theorem, we have illustrated the use of the macro `\cases`. The end of the proof is marked with a square box by using the `\eop` macro. If the proof ends with a displayed equation, put `\meop` at the end of the equation. □

4 Lists

The usual TeX macro for creating lists is called `\item`. However, if you are creating lists within a proclamation, as was done in Def. 1 above, it looks better to use the macro `\ritem` which is defined in `satmacros.tex`. It sets the numbers in roman rather than slant. Note that we prefer that you number such lists as (1), (2), etc. rather than as 1., 2., etc. If you don't want to number the items in a list, you can use our macro `\bull` in place of `\item` or `\ritem`. For an example, see the lists in Sects. 13 and 14 below.

5 Open Face Letters

Use the macros `\RR` and `\CC` for the sets $\mathbb{R}$ and $\mathbb{C}$ of real and complex numbers. You may also want to use the macros `\NN`, `\PP`, and `\ZZ` to get $\mathbb{N}$, $\mathbb{P}$, and $\mathbb{Z}$. If you have to use $\mathbb{R}$ in the title, use the macro `\RRt`. You may also use the macros `\Cbb`, `\Dbb`, `\Kbb`, `\Nbb`, `\Pbb`, `\Qbb`, `\Rbb`, `\Tbb`, and `\Zbb`, to get $\mathbb{C}, \mathbb{D}, \mathbb{K}, \mathbb{N}, \mathbb{P}, \mathbb{Q}, \mathbb{R}, \mathbb{T}, \mathbb{Z}$.

6 Bold Face Characters

To create bold-faced letters, you can use `\bf`. Thus, to get **n** you type `\bf{n}`. TEX does not include a way to get bold face mathematical symbols. For that reason, we have included in `satmacros.tex` the macros `\bfm`, as well as `\bfs` and `\bfss`, the latter for subscripts and subsubscripts, respectively, as in

$$\beta_{\beta_\beta} \neq \boldsymbol{\beta}_{\boldsymbol{\beta}_{\boldsymbol{\beta}}}.$$

7 Displayed Equations

Equations can be numbered or not numbered as you like. However, if you number them, we want equation numbers to appear on the right. The appropriate macro is `\eqno`. For short papers, we suggest numbering sequentially starting with (1).

If a sentence ends within a displayed formula, the period should be inserted in the formula after the last symbol. If the sentence continues, but a comma is appropriate at the end of the displayed formula, put it there. *Do not* insert any extra space in front of such punctuation.

To line up displayed equations you can use `\eqalign` or `\eqalignno`. Here is an example

$$\begin{aligned} N &= 2n - n_b - 2, \qquad 1 \leq n \leq 16, \\ e &= 3n - n_b - 3, \qquad 1 \leq n \leq 4. \end{aligned} \tag{1}$$

The idea is simple – you use the symbol & to mark the alignment points, and you end each line with `\cr`.

To line up equations while giving each of them its own number, you use `\eqalignno`. Here is an example:

$$N = 2n - n_b - 2, \qquad 1 \leq n \leq 16, \tag{2}$$
$$e = 3n - n_b - 3, \qquad 1 \leq n \leq 4. \tag{3}$$

8 Figures

Almost everyone these days creates figures in postscript. These can be integrated into your manuscript with the aid of the macro `\placefig` to which you supply the name of the postscript file and the width, in truecm, to which your figure should be scaled. Use the macro `\figcaption` to supply the caption for your figure(s), using `||` to indicate line breaks in case the caption is longer than one line.

As an example, the commands

```
\placefig{instruct.fig}{5}
\figcaption{{\bf Figure 1.} The function $f(x) = (x-t)_+$.}
```

result in the following picture:

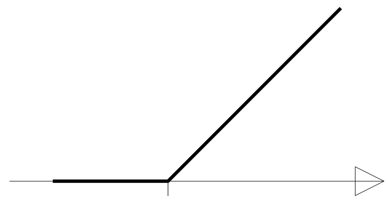

Figure 1. The function $f(x) = (x - t)_+$.

No matter how you generate figures, and regardless of whether they are `ps` files or `eps` files, it would help greatly if you would name your figure files in the form `name1.fig`, `name2a.fig`, `name2b.fig`, etc., where `name` is the name of the first author, or some abbreviation of it.

Wouldn't it be nice if you could label your figures using exactly the same fonts as are used in the rest of your paper? You can, with the aid of the macros `\figinbox` and `\ppoint` from `satmacros.tex`. For example, the next figure is generated by the following commands:

```
\showgridfalse
\figinbox instruct.fig(3.1,5.4){5}{
\ppoint01(2.8,2.1){$t$}
\ppoint10(2.5,5.1){$x$}}
\figcaption{{\bf Figure 2.} The function $f(x) = (x-t)_+$.||(Isn't
it more informative with those labels?)}
```

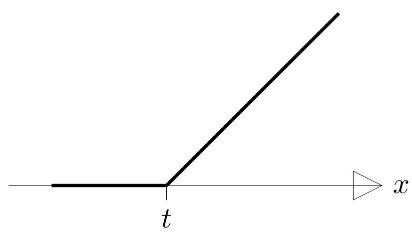

Figure 2. The function $f(x) = (x - t)_+$.
(Isn't it more informative with those labels?)

The placement macro `\ppointij(d,r){...}` generates a box containing `...`, then places this box on the page in such a way that its `ij`-point ends up `d truecm` down and `r truecm` right of the upper left corner of the grid generated by `\figinbox`. The altogether nine `ij`-points of a box are

```
00 01 02
10 11 12
20 21 22
```

To help in the placement, you can turn on a `truecm` grid by turning off that `\showgridfalse`.

9 Tables

Tables can be created with standard TEX commands. If you prefer, you can also create your table with LaTEX, convert it to postscript, and then treat it like a figure. Table captions should be created with the macro `\figcaption`.

10 Using Labels and Automatic Numbering

Some seem to think that TEX is inferior to LaTEX because only LaTEX can do automatic numbering. Nothing could be further from the truth. Automatic numbering and labelling of equations and of formal statements (Lemmas, Theorems, etc.), figures, tables, and references is easy to do in TeX using the numbering macros which are included in macro file satmacros.tex.

Whenever you want to number a formal statement, use \label{<name>} at the place at which the number is to appear. (This is exactly how the numbering earlier, of Definition 1 and Theorem 2, was managed in instruct.tex.) This causes TeX to increment an internal count, \labelnum, by 1, place that number there, and also remember the number under the name <name>.

You can refer to this number anywhere in the text by \recall{<name>}. If you don't intend to refer to the number at all, you can leave <name> empty, i.e., use \label{}.

If you would like such numbering to restart in each section, make sure that \presect is not redefined in your TeX file (compare the beginning of instruct.tex with that of textemplate.tex).

The procedure is exactly the same if you would like to number an equation. Where you would usually say \eqno(<number>), you would now say \label{<name>}. This causes TeX to increment an internal count, \eqnum, by 1, place it there inside parentheses, and remember the number by the name <name>. You would refer to this equation in the text by the command (\recall{<name>}). Again, you could choose <name> to be empty if you don't intend to refer to this number in the text.

Special care must be taken when you want to give a number to equations that are being aligned via \eqalignno. Use \eqalignlabel instead of \label there.

Finally, you may wish to give an equation the same number as a previous equation but distinguish the two by an additional letter, as in the following variant of an earlier example:

$$N = 2n - n_b - 2, \qquad 1 \le n \le 16, \tag{4a}$$

$$e = 3n - n_b - 3, \qquad 1 \le n \le 4. \tag{4b}$$

Have a look at the file instruct.tex to see how this is done using \samenumber and \eqalignlabelplus. To be sure, there is also the macro \labelplus, of use in equations that don't involve \eqalignno.

If you prefer to number all items by a single count (to make the search for a particular item as easy as possible), be sure to turn on the \singlecount macro at the beginning of your TeX file.

Also, as you work on your paper, you may find that you forgot just what name you have given a particular item. In that case, turn on the \draft macro at the beginning of your TeX file. This will cause all the names to be printed in the margins next to their items.

Finally, if macro names like \label and \recall are too long for your taste, you can also add to your macros at the beginning of your TeX file

```
\let\en\label
\let\er\recall
```

and even

```
\def\eqr#1{(\recall{#1})}
```

and use these shorter versions, \en, \er, \eqr, in your TeX file.

11 Defining *vs* Emphasizing

We have provided the macro \dword for you to mark any word or phrase when it is first defined. This causes the word or phrase to be typeset in a distinctive font and so helps the reader to see just what term in a formal definition is being defined. For example, the file instruct.tex uses type \dword {triangulation} in Def. 1 above.

This also helps the reader locate the definition of a word or term, particularly if that definition is not formal but happens as part of the text. Systematic use of \dword also helps with the creation of an index.

We have also provided the macro `\eword` for you to emphasize any word or phrase. At present, this causes the word or phrase to be typeset in italics.

12 A Few Other Macros

The macros in `satmacros.tex` are grouped according to function. Besides the ones mentioned above, we have included a few others which you may find useful. For example, you may want to use `\inpro{a,b}` and `\norm{c}` for the inner product $\langle a, b\rangle$ and the norm $\|c\|$, respectively. To get $\frac{a}{b}$, you can type `$\frac{a}{b}$`.

We encourage you to use `\dd`, `\ee`, and `\ii` for the 'd' in integrals, the base for the natural logarithm, and the imaginary unit, respectively, as in

$$\int_{-\pi}^{\pi} \mathrm{e}^{\mathrm{i}x}\, \mathrm{d}x = 0.$$

13 Some Things Not to Do

Here is a short list of some things you should **not** do:

- Do not type your TeX file using any special characters you may have on your keyboard or in your editor. This applies especially to editors that have keys for letters with diacritical marks like ä, ü, á, à, ñ, etc.
- Do not change anything in the macro file `satmacros.tex`.
- Do not redefine any of the standard macros of TeX or any of the macros in `satmacros.tex`. Thus, before you define a macro for yourself, you should check to make sure that it has not already been defined.
- Page size is not an issue. We want a uniform style and format. Do not change `\hsize`, `\vsize`, `\baselineskip`, `\magstep`, or use different fonts.
- Do not add extra space between paragraphs.
- Do not add spaces before punctuation. TeX does a very good job of spacing, and we just have to edit all such extra space out.
- Do not use footnotes. Simply put what you want to say in the text at the appropriate place (possibly in parentheses).
- Do not put a colon before every displayed equation. The only correct time to use a colon there is if you are saying something like ... *the following equation:*
- Do not simply copy references from some file you may have on hand. We have a specific reference style which is spelled out in Sect. 14 below. Please follow it.
- Do not use `\sl`, `\it`, or `\bf` to emphasize words. Instead, use `\dword` and `\eword` as explained in Sect. 11.
- When typing your TeX file, break your sentences into short pieces by hitting the *return* or *enter* key. TeX ignores blanks, and it makes your file a lot easier to read and edit.

14 References

As in all good books and journals, we would like to have a uniform way of listing references. This means different styles for journal papers, proceedings papers, books, unpublished reports or preprints, and dissertations. But, in order to save you the trouble of learning the details, of various font choices, punctuation, and the like, we have equipped satmacros.tex with macros to handle correctly any reference written in the minimal format employed in the Spline Bibliography and explained in full detail in the file journal.tex. For examples, look at the file instruct.tex which generated this document.

Having the references in this minimal format may also help you later on since, by imitating how the macros in satmacrox.tex convert these references to SAT style, you can then convert the references to any style required by any journal (see the file refmac.tex for many examples).

Please prepare your reference list carefully according to the following rules:

- Arrange your references in alphabetical order.
- Preface each references with one of \refB, \refD, \refJ, \refQ, or \refR depending on whether the reference is a book, a dissertation, a journal article, a proceedings paper, or an unpublished report or preprint.
- Then supply the author's name, in the form <lastname>, <firstname>; . If there is more than one author, repeat the pattern, i.e., supply the list of authors in the form <lastname>, <firstname>, <lastname>, <firstname>, ... <lastname>, <firstname>;, making sure there is a blank space after each comma. Here, <firstname> could be just the initials, in which case, please, leave a space between them. E.g., type Schoenberg, I. J., not Schoenberg, I.J..
- Then supply the title, also followed by a semicolon. If it is a book or dissertation, capitalize all words but the inessential ones (just as described earlier for section headings).
- Then supply the 'locator' for the reference. This depends on the particular kind of reference, as follows:

<style>	type	<locator>
B	book	<publisher-info>; <year>;
D	dissertation	<institution>; <year>;
J	in journal	<journal>; <volume>; <year>; <pages>;
Q	in proceedings	<proceedings>; <year>; <pages>;
R	report	<report-no. and institution>; <year>;

<publisher-info> is to be of the form <publisher-name> (<publisher-location>), and <publisher-name> may not end in a forced blank.

<proceedings> must be of the form (<title of proceedings>), <editor name[s]> (ed[s].), <publisher-info>, with each <editor name> of the form <editor initials> <editor last name>. Note again the need for a blank space after each comma in this form.

<pages> must have the page numbers separated by a double-dash; for example, 58--63.

For <journal>, you can save yourself some typing by using the macros, such as \JAT or \CA, for standard journals available in the file journal.tex.

There is even more saving available for any reference in a standard proceedings, as defined in the file proceed.tex. For any such, you can use the style \refP <author>; <title>; <proceedings-macro>; <pages>;.

- Notice that the minimal format consists of fields separated by semicolons. If you need to use a semicolon as part of the reference itself, enclose it in braces. Also, notice that each semicolon has to be either at the end of a line or else be followed by at least one blank space.
- What if a reference does not at all fit one of these styles? Then preface it with the command `\refX` and do the best you can (see, e.g., MacTutor [2004]).

To cite references listed in the References section, write the last name of the author followed by the year of publication in brackets. If there is more than one author, follow the first author's name by 'et al.'.

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