Input:

```
% TeX ignores anything on a line after a percent sign %
% The next two lines define fonts for the title
\font\xmplbx = cmbx10 scaled \magstep1
\font\xmplbxti = cmbxti10 scaled \magstep1
% Now here's the title.
\leftline{\xmplbx Example 1:\quad\xmplbxti Entering simple text}
\vglue 0.5\baselineskip % skip an extra half line

The definitive source of information on \TeX\ is {\sl The \TeX book}, by D.~E.~Knuth, author of the
\TeX\ program. {\sl\TeX\ for the Impatient\/} by P.~W.~Abrahams, {\it et al.}\ is also an excellent
reference.  The \TeX\ software is free; you can obtain an MS-DOS version, e.g., on the NUS ftp site
({\tt ftp.nus.sg}) in the subdirectory {\tt /pub/zf/TeX/systems/msdos/emtex}.

It's easy to prepare ordinary text for \TeX\ since \TeX\ usually doesn't care about how you break
up your input into lines.  It treats the end of a line of text like a space.%
\footnote \dag{\TeX\ treats a tab like a space too, as we point out in this {\it footnote}.}
If you don't want a space there, put a per%
cent sign (the comment character) at the end of the line.  \TeX\ ignores spaces
at the start of a line, and treats more than one space as equivalent to a single space, even after
a period.  You indicate a new paragraph by skipping a line (or more than one line).

When \TeX\ sees a period followed by a space (or the end of the line, which is equivalent), it
ordinarily assumes you've ended a sentence and inserts a little extra space after the period.  It
treats question marks and exclamation points the same way.

But \TeX's rules for handling periods sometimes need fine tuning.  \TeX\ assumes that a capital
letter before a period doesn't end the sentence, so you have to do something a little different if,
say, you're writing about DNA\null.  It's a good idea to tie words together in references such as
``see Fig.~8'' and in names such as V.~I. Lenin and in $\ldots$ so that \TeX\ will never split them
in an awkward place between two lines.  (The three dots indicate an ellipsis.)

You should put quotations in pairs of left and right single ``quotes'' so that you get the correct
left and right double quotations marks.  ``For adjacent single and double quotation marks, insert
a `thinspace'\thinspace''.  You can get en-dashes--like so, and em-dashes---like so.
\bye % end the document
```

Output:

Example 1: ***Entering simple text***

The definitive source of information on TEX is *The TEXbook*, by D. E. Knuth, author of the TEX program. *TEX for the Impatient* by P. W. Abrahams, *et al.* is also an excellent reference. The TEX software is free; you can obtain an MS-DOS version, e.g., on the NUS ftp site (`ftp.nus.sg`) in the subdirectory `/pub/zf/TeX/systems/msdos/emtex`.

It's easy to prepare ordinary text for TEX since TEX usually doesn't care about how you break up your input into lines. It treats the end of a line of text like a space.† If you don't want a space there, put a percent sign (the comment character) at the end of the line. TEX ignores spaces at the start of a line, and treats more than one space as equivalent to a single space, even after a period. You indicate a new paragraph by skipping a line (or more than one line).

When TEX sees a period followed by a space (or the end of the line, which is equivalent), it ordinarily assumes you've ended a sentence and inserts a little extra space after the period. It treats question marks and exclamation points the same way.

But TEX's rules for handling periods sometimes need fine tuning. TEX assumes that a capital letter before a period doesn't end the sentence, so you have to do something a little different if, say, you're writing about DNA. It's a good idea to tie words together in references such as "see Fig. 8" and in names such as V. I. Lenin and in ... so that TEX will never split them in an awkward place between two lines. (The three dots indicate an ellipsis.)

You should put quotations in pairs of left and right single "quotes" so that you get the correct left and right double quotations marks. "For adjacent single and double quotation marks, insert a 'thinspace' ". You can get en-dashes–like so, and em-dashes—like so.

† TEX treats a tab like a space too, as we point out in this *footnote*.

Input:

```
% define a macro so that one does not need to type the long command.
\def\xmpheader #1/#2{\leftline{\xmplbx Example #1:\quad\xmplbxti #2}\vglue 0.5\baselineskip}
\xmpheader 2/{Indentation}
\noindent Now let's see how to control indentation.  If an ordinary word processor can do it, so
surely can \TeX.  Note that this paragraph isn't indented.

Usually you'll either want to indent paragraphs or to leave extra space between them.  Since we
haven't changed anything yet, this paragraph is indented.

{\parindent = 0pt \parskip 6 pt % The left brace starts a group containing the unindented text.
Let's do these two paragraphs a different way, with no indentation and six printer's points of
extra space between paragraphs.

So here's another paragraph that we're typesetting without indentation.  If we didn't put space
between these paragraphs, you would have a hard time knowing where one ends
and the next begins.\par % The paragraph *must* be ended within the group.
}% The right brace ends the group containing unindented paragraphs.

It's also possible to indent both sides of entire paragraphs.  The
next three paragraphs illustrate this:
\smallskip % Provide a little extra space here.
% Skips like this and \vskip below end a paragraph.
{\narrower
``We've indented this parapgrah on both sides by the paragraph indentation.
This is often a good way to set long quotations.

``You can do multiple paragraphs this way if you choose.  This is the second
paragraph that's singly indented.''\par}

{\narrower \narrower You even make paragraphs doubly narrow if that's
what you need.  This is an example of a doubly narrowed paragraph.\par}
\vskip 1pc % Skip down one pica for visual separation.
In this paragraph we're back to the normal margins, as you can see for yourself.  We'll let it run
on a little longer so that the margins are clearly visible.

{\leftskip .5in Now we'll indent the left margin by half an inch and leave
the right margin at its usual position.\par}
{\rightskip 0.5in Finally, we'll indent the right margin by half an inch
and leave the left margin at its usual position.\par}
\bye % end the document
```

Output:

Example 2: ***Indentation***

Now let's see how to control indentation. If an ordinary word processor can do it, so surely can TeX. Note that this paragraph isn't indented.

Usually you'll either want to indent paragraphs or to leave extra space between them. Since we haven't changed anything yet, this paragraph is indented.

Let's do these two paragraphs a different way, with no indentation and six printer's points of extra space between paragraphs.

So here's another paragraph that we're typesetting without indentation. If we didn't put space between these paragraphs, you would have a hard time knowing where one ends and the next begins.

It's also possible to indent both sides of entire paragraphs. The next three paragraphs illustrate this:

> "We've indented this parapgrah on both sides by the paragraph indentation. This is often a good way to set long quotations.
>
> "You can do multiple paragraphs this way if you choose. This is the second paragraph that's singly indented."
>
> > You even make paragraphs doubly narrow if that's what you need. This is an example of a doubly narrowed paragraph.

In this paragraph we're back to the normal margins, as you can see for yourself. We'll let it run on a little longer so that the margins are clearly visible.

Now we'll indent the left margin by half an inch and leave the right margin at its usual position.

Finally, we'll indent the right margin by half an inch and leave the left margin at its usual position.

Input:

```
\xmpheader 3/{Fonts and special characters}
\chardef \\ = `\\ % Let \\ denote a backslash

\font\tencmss = cmss10  % Load some unstandard fonts
\font\tencmssbx = cmssbx10
\font\bigbf = cmbx10 scaled \magstep2  % You can use \magstep1 upto \magstep5.

{\it Here are a few words in an italic font}, {\bf a few words in a boldface font}, {\it and a\/
{\bf mixture} of two, with two\/ {\rm roman words} inserted}.  Where an italic font is followed by
a nonitalic font, we've inserted an ``italic correction'' ({\tt \\/}) to make spacing look right.
Here's a {\sevenrm smaller} word---but the standard \TeX\ fonts won't give you anything smaller
than {\fiverm this}. The standard font like the current one is called cmr10.  {\tencmss But now
we are using cmss10} {\tencmssbx or in its bold version}.  Here is a {\bigbf big A}.  You can magnify
the whole document by saying {\tt \\magnification \\magstep1}, at the very beginning of the file.

If you need any of the characters:
\medskip
\centerline{\$ \quad \& \quad \# \quad \_ \quad \% \quad
\char`\^ \quad \char`\~ \quad $\{$ \quad $\}$ \quad $\backslash$}
% The \quad inserts an em space between charaters.
\medskip
\noindent you'll need to write them a special way. Look at the input to see how to do it.

\TeX\ has the accents and letters that you'll need for French words such as {\it r\^ ole\/} and
{\it \'el\`eve}, for German words such as {\it Schu\ss}, and for words in several other languages
as well.  You'll find a complete list of \TeX's accents and letters of European languages in the
\TeX book.

You can also get Greek letters such as ``$\alpha$'' and ``$\Omega$'' for use in math, card suits
such as ``$\spadesuit$'' and ``$\diamondsuit$'', music symbols such as ``$\sharp$'' and
``$\flat$'', and many other special symbols.  \TeX\ will only accept these sorts of special symbols
in its ``math mode'', so you'll to enclose them within `{\tt \$}' characters.  Here are some
more strange-looking symbols, $\Upsilon$, $\varpi$, $\partial$, $\wr$,
and $\hookleftarrow$.

Many files are involved in the \TeX\ system. The {\tt .mf} file contains the source codes for
the metafont program, which generate {\tt .tfm} and {\tt .pk} font files.  Most part of \TeX's
definitions are in the file {\tt plain.tex}.
\bye % end the document
```

Output:

Example 3: *Fonts and special characters*

Here are a few words in an italic font, **a few words in a boldface font**, *and a* **mixture** *of two, with two* roman words *inserted*. Where an italic font is followed by a nonitalic font, we've inserted an "italic correction" (`\/`) to make spacing look right. Here's a smaller word—but the standard TEX fonts won't give you anything smaller than this. The standard font like the current one is called cmr10. But now we are using cmss10 **or in its bold version**. Here is a **big A**. You can magnify the whole document by saying `\magnification \magstep1`, at the very beginning of the file.

If you need any of the characters:

$ & # _ % ˆ ˜ { } \

you'll need to write them a special way. Look at the input to see how to do it.

TEX has the accents and letters that you'll need for French words such as *rôle* and *élève*, for German words such as *Schuß*, and for words in several other languages as well. You'll find a complete list of TEX's accents and letters of European languages in the TEXbook.

You can also get Greek letters such as "α" and "Ω" for use in math, card suits such as "$\spadesuit$" and "$\diamondsuit$", music symbols such as "$\sharp$" and "$\flat$", and many other special symbols. TEX will only accept these sorts of special symbols in its "math mode", so you'll to enclose them within '`$`' characters. Here are some more strange-looking symbols, Υ, ϖ, ∂, $\wr$, and $\hookleftarrow$.

Many files are involved in the TEX system. The `.mf` file contains the source codes for the metafont program, which generate `.tfm` and `.pk` font files. Most part of TEX's definitions are in the file `plain.tex`.

Input:

```
\xmpheader 4/{Spacing, rules, and boxes}
Here's an example of a ``description list''. \par
% Call the indentation for descriptions \descindent, to avoid repetitive
% constructs, we'' define a macro
\newdimen\descindent \descindent = 8pc
\def\describe#1{\par\noindent \llap{\hbox to \descindent{\bf #1\hfil}}}
{\leftskip = \descindent \parskip = 0.5 \baselineskip
% Move the description to the left of the paragraph.
\describe{Queen of Hearts}An ill-tempered woman, prone to saying ``Off with his head!''
at the slightest provocation.
\describe{Cheshire Cat}A cat with an enormous smile that Alice found in a tree.
\describe{Mock Turtles}A lachrymose creature, quite a storyteller, who was a companion
to the Cryphon.  Reputedly the principal ingredient of Mock Turtle Soup.
\par}
\bigskip\hrule\bigskip % A line with vertical space around it.
Here's an example of some words in a ruled box, just as Lewis Carroll wrote them:
\medskip
% Put 8pt of space between the text and the surrounding rules.
\hbox{\vrule\vbox{\hrule
   \hbox spread 8 pt{\hfil\vbox spread 8pt {\vfil
       \hbox{Who would not give all else for twop}%
       \hbox{ennyworth only of Beautiful Soup?}%
   \vfil}\hfil}
\hrule}\vrule}%
\medskip
\smallskip
\line{\hfil\hbox to 3 in{\leaders\hbox{ * }\hfil}\hfil}
\bigskip
\line{\hskip -4pt\vrule\hfil\vbox{Here we've gotten the effect of a revision bar on the material
in this paragrah.  The revision bar might indicate a change.}}

You use the Unix command {\tt tex $file$} to evoke the \TeX\ program; which translate your \TeX\
source into {\tt $file$.dvi}. Then {\tt dvips $file$} produces {\tt $file$.ps}, which you can
send to printer. You can view the {\tt dvi} file by {\tt xdvi} and {\tt ps} file by {\tt ghostview}.
\bye % end the document
```

Output:

Example 4: *Spacing, rules, and boxes*

Here's an example of a "description list".

Queen of Hearts An ill-tempered woman, prone to saying "Off with his head!" at the slightest provocation.

Cheshire Cat A cat with an enormous smile that Alice found in a tree.

Mock Turtles A lachrymose creature, quite a storyteller, who was a companion to the Cryphon. Reputedly the principal ingredient of Mock Turtle Soup.

Here's an example of some words in a ruled box, just as Lewis Carroll wrote them:

Who would not give all else for twop
ennyworth only of Beautiful Soup?

* * * * * * * * * * * * * * * * * *

Here we've gotten the effect of a revision bar on the material in this paragrah. The revision bar might indicate a change.

You use the Unix command `tex` *file* to evoke the TeX program; which translate your TeX source into *file*`.dvi`. Then `dvips` *file* produces *file*`.ps`, which you can send to printer. You can view the `dvi` file by `xdvi` and `ps` file by `ghostview`.

Input:

```
\xmpheader 5/{Odds and ends}
\chardef \\ = `\\ % let \\ denote a backslash
\footline{\hfil{\tenit -- \folio\ --}\hfil} %\footline provives a footer line.
% Here it's a centered, italicized page number.
\TeX\ knows how to hypernate words, but it isn't infallible.  If you are discussing the chemical
${\it 5}$-[p-(Flouro\-sul\-fonyl)ben\-zoyl]-l,%
$N^6$-ethe\-no\-adeno\-sine and \TeX\ complains to you about an ``overfull hbox'', try inserting some
``discretionary hyphens''.  The notation `{\tt \\-}' tells \TeX\ about a dis\-cre\-tion\-ary hypen,
that is, one that it might not have inserted otherwise.
\medskip
{\raggedright You can typeset text unjustified, i.e., with an uneven right margin.  In the old days,
before word processors were common, typewritten documents were unjustified beause there was no
convenient alternative.  Some people prefer text to be unjustified so that the spacing between words
can be uniform.  Most books are set with justified margin, but not all.\par}

\proclaim Assertion 27.  There is an easy way to typeset the headings of assertions, theorems, etc.

Here's an example of how to typeset an itemized list two levels deep.  If you need more levels,
you'll have to program it yourself, alas.
\smallskip
\item {1.} The is the first item.
\item {2.} This is the second item.  It consists of two paragraphs.  We've
indented the second paragraph so that you can easily see where it starts.
\item {} \indent The second paragraph has three subitems underneath it.
\itemitem {(a)} This is the first subitem.
\itemitem {(b)} This is the second subitem.
\itemitem {(c)} This is the third subitem.
\item{$\bullet$} This is a strange-looking item because it's completely different from the others.
\smallskip
\leftline{Here's a left-justified line.$\Leftarrow$}
\rightline{$\Rightarrow$Here's a right-justified line.}
\centerline{$\Rightarrow$Here's a centered line.$\Leftarrow$}
% Don't try to use these commands within a paragraph.
\bye % end the document
```

Output:

Example 5: *Odds and ends*

TEX knows how to hypernate words, but it isn't infallible. If you are discussing the chemical *5*-[p-(Flourosulfonyl)benzoyl]-l,N^6-ethenoadenosine and TEX complains to you about an "overfull hbox", try inserting some "discretionary hyphens". The notation '`\-`' tells TEX about a discretionary hypen, that is, one that it might not have inserted otherwise.

You can typeset text unjustified, i.e., with an uneven right margin. In the old days, before word processors were common, typewritten documents were unjustified beause there was no convenient alternative. Some people prefer text to be unjustified so that the spacing between words can be uniform. Most books are set with justified margin, but not all.

Assertion 27. *There is an easy way to typeset the headings of assertions, theorems, etc.*

Here's an example of how to typeset an itemized list two levels deep. If you need more levels, you'll have to program it yourself, alas.

1. The is the first item.
2. This is the second item. It consists of two paragraphs. We've indented the second paragraph so that you can easily see where it starts.

   The second paragraph has three subitems underneath it.
   - (a) This is the first subitem.
   - (b) This is the second subitem.
   - (c) This is the third subitem.
- This is a strange-looking item because it's completely different from the others.

Here's a left-justified line.⇐

⇒Here's a right-justified line.

⇒Here's a centered line.⇐

Input:

```
\xmpheader 6/{A ruled table}
\bigskip
{\offinterlineskip % So the vertical rules are connected.
\def\tablerule{\noalign{\hrule}}% \tablerule constructs a thin rule across the table.
\def\tableskip{\omit&height 9pt&&&\omit\cr}% \tableskip create 9pt of space between entries.
% & separates templates for each column. TeX substitutes the text of the entries for #. We must have
% a strut present in every row of the table; otherwise, the boxes won't butt together properly,
% and the rules won't join.
\halign{\tabskip = .7em plus 1 em % glue between columns. Use \vtop for short multiline entries.
\vtop{\hsize=6pc \pretolerance=10000 \hbadness=10000 \normalbaselines \rightskip=3pt plus2em
\noindent \it#\strut}&\vrule #&#\hfil &\vrule #% the rules and midle column.
&\vtop{\hsize=11pc \parindent=0pt \normalbaselineskip=12pt \normalbaselines
\rightskip=3pt plus2em #}\cr
% The table rows begin here.
\noalign{\hrule height2pt depth2pt \vskip3pt}
\multispan5\bf Some Choice Edible Mushrooms\hfil\strut\cr % The header row spans all the column.
\noalign{\vskip3pt} \tablerule \omit&height 3pt&\omit&&\omit\cr
\bf Botanical&&\bf Common&&\omit\bf Identifying \hfil\cr
\noalign{\vskip -2pt}% close up lines of heading
\bf Name&&\bf Name &&\omit \bf Characteristics \hfil\cr
\tableskip Pleurotus ostreatus&&Oyster mushroom&&Grow in shelf\kern 1pt like
% whithout the kern, the 'f' and 'l' would be too close
clusters on stumps or logs, pink-gray oyster-shaped caps, stem short or absent.\cr
\tableskip Lactarius hygrophoroides&&Milky hygroph&&Butterscotch-brown cap and stem,
copious white latex, often on ground in woods near streams.\cr
\tableskip Morchella esculenta&&White morel&&Conical cap with black pits and white ridges; no gills.
Often found near old apple trees and dying elms in the spring.\cr
\tableskip Boletus edulus&&King bolete&&Reddish-brown to tan cap with yellow pores
(white when young), bulbous stem, often near conifers, birch, or~aspen.\cr
\tableskip \tablerule \noalign{\vskip 2pt} \tablerule}
}
\bye % end the document
```

Output:

Example 6: *A ruled table*

Some Choice Edible Mushrooms

Botanical Name	**Common Name**	**Identifying Characteristics**
Pleurotus ostreatus	Oyster mushroom	Grow in shelflike clusters on stumps or logs, pink-gray oyster-shaped caps, stem short or absent.
Lactarius hygrophoroides	Milky hygroph	Butterscotch-brown cap and stem, copious white latex, often on ground in woods near streams.
Morchella esculenta	White morel	Conical cap with black pits and white ridges; no gills. Often found near old apple trees and dying elms in the spring.
Boletus edulus	King bolete	Reddish-brown to tan cap with yellow pores (white when young), bulbous stem, often near conifers, birch, or aspen.

Input:

```
\xmpheader 7/{Typesetting mathematics}
For a spherical triangle with sides $a$, $b$, and $c$, and opposite
angles $\alpha$, $\beta$, and $\gamma$, we have:
$$\cos\alpha=-\cos\beta\cos\gamma+\sin\beta\sin\gamma\cos\alpha\quad\hbox{(Law of Cosines)}$$
and:
$$\tan{\alpha \over 2} = \sqrt{-\cos\sigma \cdot \cos(\sigma - \alpha) \over \cos(\sigma - \beta)
\cdot \cos(\sigma - \gamma)}, \quad \hbox{where $\sigma = {1\over 2}(a+b+c)$}$$
We also have:$$\sin x = {e^{ix} - e^{-ix} \over 2}$$ and:
$$\int_0^\infty{\sin ax \sin bx \over x^2}\, dx % The \, produces a thin space
= {\pi a \over 2}, \quad \hbox{if $a < b$}$$
\noindent The number of combinations ${}_nC_r$ of $n$ things taken $r$ at a time is:
$$C(n,r) = {}_nC_r = {n\choose r} = {n(n-1) \cdots (n-r+1) \over r(r-1) \cdots (1)}
= {n!\over r!(n-r)!}$$
\noindent The value of the determinant $D$ of order $n$:
$$D = \left|\matrix{a_{11}&a_{12}&\ldots&a_{1n}\cr
   a_{21}&a_{22}&\ldots&a_{2n}\cr
   \vdots&\vdots\ddots&\vdots\cr
   a_{n1}&a_{n2}&\ldots&a_{nn}\cr}\right| $$
is defined as the sum of $n!$ terms:
$$\sum\>(\pm)\>a_{1i}a_{2j}\ldots a_{nk}$$ % The \> produces a medium space.
where $i$, $j$, \dots,~$k$\/ take on all possible values between $1$ and $n$, and the sign of
the product is $+$ if the sequence $i$, $j$, \dots,~$k$\/ is an even permutation and $-$ otherwise.
Moreover:
$$Q(\xi)=\lambda_1 y_1^2\sum_{i=2}^n \sum_{j=2}^n y_i b_{ij} y_j,\qquad B=\Vert b_{ij}\Vert=B'$$
\bye % end the document
```

Output:

Example 7: *Typesetting mathematics*

For a spherical triangle with sides a, b, and c, and opposite angles α, β, and γ, we have:

$$\cos\alpha=-\cos\beta\cos\gamma+\sin\beta\sin\gamma\cos\alpha\quad\text{(Law of Cosines)}$$

and:

$$\tan\frac{\alpha}{2} = \sqrt{\frac{-\cos\sigma \cdot \cos(\sigma - \alpha)}{\cos(\sigma - \beta) \cdot \cos(\sigma - \gamma)}}, \quad \text{where } \sigma = \tfrac{1}{2}(a+b+c)$$

We also have:

$$\sin x = \frac{e^{ix} - e^{-ix}}{2}$$

and:

$$\int_0^\infty\frac{\sin ax \sin bx}{x^2}\, dx = \frac{\pi a}{2}, \quad \text{if } a < b$$

The number of combinations ${}_nC_r$ of n things taken r at a time is:

$$C(n,r) = {}_nC_r = \binom{n}{r} = \frac{n(n-1) \cdots (n-r+1)}{r(r-1) \cdots (1)} = \frac{n!}{r!(n-r)!}$$

The value of the determinant D of order n:

$$D = \begin{vmatrix} a_{11}&a_{12}&\ldots&a_{1n}\\ a_{21}&a_{22}&\ldots&a_{2n}\\ \vdots&\vdots\ddots&\vdots\\ a_{n1}&a_{n2}&\ldots&a_{nn}\end{vmatrix}$$

is defined as the sum of $n!$ terms:

$$\sum\>(\pm)\>a_{1i}a_{2j}\ldots a_{nk}$$

where i, j, $\dots$, k take on all possible values between 1 and n, and the sign of the product is $+$ if the sequence i, j, $\dots$, k is an even permutation and $-$ otherwise. Moreover:

$$Q(\xi)=\lambda_1 y_1^2\sum_{i=2}^n \sum_{j=2}^n y_i b_{ij} y_j,\qquad B=\Vert b_{ij}\Vert=B'$$

Input:

```
\xmpheader 8/{More mathematics}
The absolute value of $X$, $|x|$, is define by:
$$|x| = \cases{x, & if $x\ge 0$; \cr
-x,&otherwise.\cr}$$
Now for some numbered equations.  It is the case that for $k \ge 0$:
$$x^{k^2} =\overbrace{x\>x\>\cdots\> x}^{k^2\rm\ times} \eqno(1)$$
Here's an example that shows some spacing controls, with a number on the left:
$$[u]\![v][w]\,[x]\>[y]\;[z] \leqno(2a)$$
The amount of space between the items in brackets gradually increases from left to right.
(We've made the space between the first two items be {\it less\/} than the natural space.)
It is sometimes the case that
$$\leqalignno{u'_1 + tu''_2 &= u'_2 + tu_1''&(2b)\cr
\hat\imath &\ne \hat\jmath&(2c)\cr
\vec{\vphantom{b}a}&\approx \vec b\cr}$$
% The \vphantom is an invisible rule as tall as a 'b'.
The result is of order $O(n \log\log n)$.  Thus
$$\sum_{i=1}^{n} x_i = x_1+x_2+\cdots+x_n = {\rm Sum}(x_1,x_2,\cdots,x_n). \eqno(3)$$
and $$dx\,dy = r\, dr\, d\theta\!. \eqno(4)$$
The set of all $q$ such that $q\le 0$ is written as:
$$ \{\,q\mid q\le0\, \}$$
Thus
$$\forall x\exists y\; P(x,y) \Rightarrow \exists x\exists y\;P(x,y)$$
where
$$P(x,y) \buildrel \rm def \over \equiv \hbox{\rm any predicate in $x$ and $y$}.$$



\bye % end the document
```

Output:

Example 8: *More mathematics*

The absolute value of X, $|x|$, is define by:

$$|x| = \begin{cases} x, & \text{if } x \ge 0; \\ -x, & \text{otherwise.} \end{cases}$$

Now for some numbered equations. It is the case that for $k \ge 0$:

$$x^{k^2} = \overbrace{x\;x\;\cdots\;x}^{k^2\text{ times}} \tag{1}$$

Here's an example that shows some spacing controls, with a number on the left:

$$[u]\![v][w]\,[x]\:[y]\;[z] \tag{2a}$$

The amount of space between the items in brackets gradually increases from left to right. (We've made the space between the first two items be *less* than the natural space.) It is sometimes the case that

$$u'_1 + tu''_2 = u'_2 + tu''_1 \tag{2b}$$

$$\hat\imath \ne \hat\jmath \tag{2c}$$

$$\vec{a} \approx \vec{b}$$

The result is of order $O(n \log\log n)$. Thus

$$\sum_{i=1}^{n} x_i = x_1 + x_2 + \cdots + x_n = \mathrm{Sum}(x_1, x_2, \cdots, x_n). \tag{3}$$

and

$$dx\,dy = r\,dr\,d\theta\!. \tag{4}$$

The set of all q such that $q \le 0$ is written as:

$$\{\,q \mid q \le 0\,\}$$

Thus

$$\forall x \exists y\; P(x,y) \Rightarrow \exists x \exists y\; P(x,y)$$

where

$$P(x,y) \stackrel{\mathrm{def}}{\equiv} \text{any predicate in } x \text{ and } y.$$

Input:

```
\xmpheader 9/{Miscellany}
\TeX\ understand the following units for measuring distances:
\halign{\hskip 2\parindent \tt#\quad\hfil&#\hfil\cr
pt & point (72.27 points $=$ 1 inch)\cr
pc & pica (1 pica $=$ 12 points)\cr
in & inch (1 inch $=$ 2.54 centimeters)\cr
cm & centimeter (1 centimeter = 10 millimeters)\cr
mm & millimeter\cr
}
\medskip
By default, the left and top margins will be 1 inch, but this can be changed (see the source above).
\hoffset -5mm \voffset 2mm % move to the left by 5 mm and move down 2mm.
The ink goes in the rectangle $hsize \times vsize$.  The default value is $6 \times 8.9$ in inches.
\hsize = 6in \vsize=8.9in
\medskip
You can include figure in connection with the {\tt dvips}.  For that you need to include the
macro package {\tt epsf.tex}.
\input epsf.tex
Now you can say
\vskip 12 pt plus 4 pt minus 4 pt % equivalent to \bigskip
\leftline{\hskip\parindent\epsfysize=2in\epsffile{picture.ps}}\bigskip
\noindent Picture is in the form of encapsulated PostScript.
\bye % end the document
```

Output:

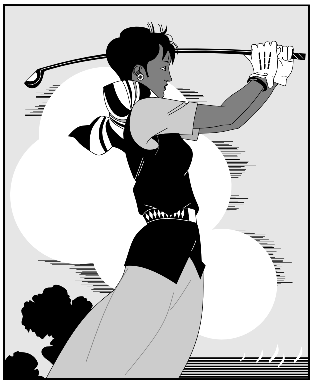
Example 9: *Miscellany*

TEX understand the following units for measuring distances:

`pt`	point (72.27 points = 1 inch)
`pc`	pica (1 pica = 12 points)
`in`	inch (1 inch = 2.54 centimeters)
`cm`	centimeter (1 centimeter = 10 millimeters)
`mm`	millimeter

By default, the left and top margins will be 1 inch, but this can be changed (see the source above). The ink goes in the rectangle $hsize \times vsize$. The default value is 6×8.9 in inches.

You can include figure in connection with the `dvips`. For that you need to include the macro package `epsf.tex`. Now you can say



Picture is in the form of encapsulated PostScript.