```
*   *   *   *   *   *   *   *   *   *
```

# Problems

```
*   *   *   *   *   *   *   *   *   *
```

## Hanging punctuation

In the last issue, Problem #2 gave this example of a paragraph in which (nearly) all line-initial and line-final punctuation symbols extended into the margin, so that the text itself is aligned:

> 'Now is the time for all good men to come to the aid of their party.' 'I hope this works.' "Do you also?" "Hope it works, I mean." 'In quotes.' 'In single quotes.' "In double quotes." How now brown cow? "The rain in spain stays mainly on the plain." This is a sentence. I should take the time to look for a nicely typeset book that has paragraphs, paragraphs, and paragraphs with hanging punctuation, so that I will have examples of characters, such as periods, commas, and quotation marks, that "protrude" into the margin. If I am lucky, this rather short, and very disjointed, paragraph will illustrate what I need to use to debug these macros.

The problem: prepare a file PUNCTUATION.TEX containing definitions necessary to make punctuation characters behave as shown. The following set of definitions is one possible solution.

```
\spaceskip .3em plus .4em minus .1em

\def\,#1{{\def\'{`}
        \xdef\blah{#1}
        \def\space{ }
        \ifx \blah\space{\comma}
        \else{,}
        }#1}

\def\comma{\save0\hbox
     {,\hskip .3em}\hbox to 0pt{,\hss}\hskip
              1wd0 plus .5em minus .08em}

\def\.#1{{\def\'{`}
        \xdef\blah{#1}
        \def\space{ }
        \ifx \blah\space{\period}
        \else{.}
        }#1}
```

```
\def\period{\save0\hbox
     {.\hskip .3em}\hbox to 0pt{.\hss}\hskip
              1wd0 plus 1.2em minus .033em}

\def\'#1{{\def\'{test for double quote}
        \xdef\blah{#1}
        \ifx \blah\'{\rightquote{''}}
        \else{\rightquote{'}#1}
        }}

\def\`#1{{\def\`{test for double quote}
        \xdef\blah{#1}
        \ifx \blah\`{\leftquote{``}}
        \else{\leftquote{`}#1}
        }}

\def\leftquote#1{\save0\hbox
        {#1}\ifvmode{$ $\hskip -1wd0}\else{}
   \hskip 1wd0\null\penalty1000\hskip -1wd0 #1}

\def\rightquote#1{\save0\hbox
        {#1\hskip .3em}\hbox to
   0pt{#1\hss}\hskip 1wd0 plus .4em minus .1em}

\chcode`54=13    % Make , automatically invoke \,
\chcode`39=13    % Make ' automatically invoke \'
\chcode`140=13   % Make ` automatically invoke \`
\chcode`46=13    % Make . automatically invoke \.
```

When a comma or period is encountered, the macros check whether the next character is a space (macros \, and \.). If so, appropriate glue is inserted (macros \comma and \period) to produce the desired effect if the character should occur at the end of a line.

When a single left or right quotation mark is encountered, macros \` and \' test to see if the next character is another occurrence of the same symbol and then call respectively \leftquote or \rightquote to insert the symbol and appropriate glue. The \leftquote macro must also test to see if the open quote symbol is the first character in a new paragraph. This approach is not completely general, because it assumes that the closing quotation marks will be followed by white space. This does not account for apostrophes, for example, or quotation marks followed by parentheses. To solve this problem, the quotation mark macros can be extended, by analogy to the comma and period macros, to test whether they are followed by spaces.

Users of versions of TeX that do not provide the \ifx control sequence may want to modify the input slightly, by inserting backslash characters before punctuation symbols, or by using the "long form" (\comma) directly, as was necessary for preparing this copy. (At the AMS, the version of TeX being used is an antique—a SAIL version current as of March 1981. We hope the next issue of TUGboat will be a demonstration of TeX82.)