HTML

You have taken on a job at a company that has an older website written in pure HTML. They discovered recently that the website works very poorly. They themselves have given up, since they lack the necessary expertise. Their final hope is that the young and promising computer scientist will find out what in the world is going on. The website consists of thousands of handwritten HTML pages; any talk of "making something new and fresh" is met with a puzzled look.

It does not take you very long to find a recurring error in many of the faulty pages: many of the handwritten HTML files are incorrectly formatted! You notice that in many places a `<div>` tag is opened, but is never closed with a `</div>`. Other places a closing `</div>` tag occurs without ever having been opened. Here is an example of one incorrectly formatted HTML file:

```
<div>
  <div>
    Velkommen til nettsiden vår!
  <div>
   Se våre nyeste saker!
    <div>
    Vi har ansatt en ung person! Kanskje blir nettsiden oppdatert nå?
    FØLG MED PÅ UTVIKLINGEN. Hilsen Kåre.
    </div>
</div>
```

(a)

You realize that the first thing you need to do is to find all the files that contain errors. After a bit of Unix magic, you are left with files where all text except `<div>` and `</div>` have been removed. Everything runs smoothly until you have to solve a small puzzle:

> *How to check that each tag that is opened with `<div>` is also closed with `</div>`, and that no tag is closed before it is opened?*

Your task is to write a procedure `GoodDivs` that checks this property, i.e., that `<div>` tags are well-formatted. It takes an array `A` as an argument where each element is either the string `"<div>"` or the string `"</div>"`.

ALGORITHM: DECIDE IF -TAGS ARE WELL-FORMATTED

Input: An array of `"<div>"` and `"</div>"` of length n
Output: Returns **true** if the tags are well-formatted, **false** otherwise

```
1 Procedure GoodDivs(A)
    // Fill in
```

(b)

Assume that the method `GoodDivs` works properly and finds many files that contain incorrectly formatted HTML. Unfortunately, it does not detect all the files reported erroneous. You notice that they contain the same error, however with other types of tags! So it is not just the `<div>`-tags causing problems, but other tags like `<head>`, `<body>`, `<p>` and several others as well. You realize that the procedure `GoodDivs` must be generalized to a procedure `GoodTags`.

> *How to check that each tag that is opened is also closed with a tag of the same type, and that no tag is closed before it is opened?*

You already have a simple procedure `isOpen`. It takes a string and returns **`true`** if it is an open tag and **`false`** if it is a closing tag, i.e., `isOpen("<tag>")` returns **`true`** and `isOpen("</tag>")` returns **`false`**. In addition, you have a procedure that returns a tag's type, e.g., `TagType("<div>")` gives `"div"`, and `TagType("</p>")` gives `"p"`.

ALGORITHM: DECIDE IF THE TAGS ARE WELL-FORMATTED

Input: An array A of tags of length n
Output: Returns **`true`** if the tags are well-formatted, **`false`** otherwise

```
1 Procedure GoodTags(A)
    // Fill in
```

Hint: A clever choice of data structure may be very helpful here.