512 (*T*-strings) Let us call a string S: *("a", "b", "c") a *T*-string if no two adjacent nonempty segments are identical:

$$\neg\exists i, j, k\cdot\ 0 \le i < j < k \le \leftrightarrow S\ \wedge\ S_{i;..j} = S_{j;..k}$$

Write a program to output all *T*-strings in alphabetical order. (The mathematician Axel Thue proved that there are infinitely many *T*-strings.)

After trying the question, scroll down to the solution.

§ Define R = (print all T-strings in alphabetical order) .
Define Z = (print all T-strings from S on in alphabetical order) .
Define T = (S is a T-string) = $\neg\exists i, j, k\cdot 0\le i<j<k\le\leftrightarrow S \land S_{i;..j} = S_{j;..k}$.
Define U = (S has no adjacent nonempty identical segments of length $< l$)
= $\neg\exists i, j, k\cdot 0\le i<j<k\le\leftrightarrow S \land j-i<l \land S_{i;..j} = S_{j;..k}$.

$R \Leftarrow S:=$ "". $T\Rightarrow Z$
$T\Rightarrow Z \Leftarrow !S.\ S:= S;$"a". Z
$Z \Leftarrow l:= 1.\ U\Rightarrow Z$
$U\Rightarrow Z \Leftarrow$
if $\leftrightarrow S \ge 2\times i$
then **if** $S_{\leftrightarrow S-2\times i;..\leftrightarrow S-i} = S_{\leftrightarrow S-i;..\leftrightarrow S}$
then S:= (the alphabetically next text that is not longer). Z
else $i:= i+1.\ U\Rightarrow Z$ **fi**
else $T\Rightarrow Z$ **fi**

S:= (the alphabetically next text that is not longer) $\Leftarrow$
if $S_{\leftrightarrow S-1}$ = "a" **then** $S:= S_{0;..\leftrightarrow S-1}$;"b"
else if $S_{\leftrightarrow S-1}$ = "b" **then** $S:= S_{0;..\leftrightarrow S-1}$;"c"
else $S:= S_{0;..\leftrightarrow S-1}$. S:= (the alphabetically next text that is not longer) **fi fi**

The one insight is the fact that a non-T-string cannot be made into a T-string by extending it, hence the assignment S:= (the alphabetically next text that is not longer) . We are assured that there is one by Thue.