Homework 7: Slack Elasticity

Homework in class on the date indicated above. Late homeworks will be penalized by
5 \cdot 2^{n-1}\% , where \( n \) is the number of days the assignment is late. Please indicate which
problems, if any, took extra time.


Expanded version available at http://www.async.caltech.edu/publications.html

As in lecture, this assignment will use \([G \rightarrow S]\) to stand for \( \text{if } G \rightarrow S \text{ fi} \) as well as \(*[G \rightarrow S]\) for
\( \text{do } G \rightarrow S \text{ od} \) and also the abbreviations \([G]\) to mean \( [G \rightarrow \text{skip}] \) and \(*[S]\) to mean \(*[\text{true} \rightarrow S]\).

1. Slack elasticity

For the following programs, determine if they are slack elastic, and if not, introduce modifications such
that they become slack elastic while maintaining the same process decomposition and the same sequence
of values sent on all the channels already present.

i.

\[
N \equiv *[ \text{true} \rightarrow R! - 1 \| \text{true} \rightarrow S! ] \\
A \equiv s := 0; *[ [ R \rightarrow R?x ] \| S \rightarrow S?x ]; s := s + x; P!s ] \\
PRINTER \equiv *[ P?r; \text{print } r ] \\
SYSTEM \equiv N \| A \| PRINTER
\]

ii.

\[
D \equiv p := 0; *[ [ p = 0 \rightarrow R! - 1 \| p = 1 \rightarrow S! ] ]; p := 1 - p ] \\
A \equiv s := 0; *[ [ R \rightarrow R?x ] \| S \rightarrow S?x ]; s := s + x; P!s ] \\
PRINTER \equiv *[ P?r; \text{print } r ] \\
SYSTEM \equiv D \| A \| PRINTER
\]