Final Exam Definitions

All new definitions that are relevant to the exam. They will be repeated on the exam itself, but you might find it useful to read and understand them before the exam to reduce reading time during the actual exam.

All old definitions that you are expected to know (modular arithmetic, undecidability, cardinality, set theory) DO NOT appear on this list but could be tested on the exam.

(a) \( S^* = S^0 \cup S^1 \cup \cdots \) = the set of all strings made up of characters in \( S \)

(b) A function is increasing iff \( a \leq b \rightarrow f(a) \leq f(b) \)

(c) We say a binary relation \( R \subseteq A \times B \) is an injection iff

\[
\forall ((x, a) \in R) \forall ((y, b) \in R)(a = b \rightarrow x = y)
\]

(d) Let \( \Sigma = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, [ , ] , \} \). Define \( S(s) \) where \( s \in \Sigma^* \) as the set of numbers defined by interpreting \( s \) as a List. If no such interpretation exists, \( S(s) = \emptyset \). For example, \( S([[]]) = \emptyset \), \( S([10, 10, 10]) = \{10\} \), and \( S([1, 400, 3, 2, 1]) = \{1, 2, 3, 400\} \).

(e)

\[
\text{List} = [] \mid \text{Int} :: \text{List}
\]

\[
in(a, []) = \text{false}
\]

\[
in(a, x :: L) = a = x \text{ or } in(a, L)
\]

\[
\text{append}(a, []) = a :: []
\]

\[
\text{append}(a, x :: L) = x :: \text{append}(a, L)
\]

\[
\text{remove}(a, []) = []
\]

\[
\text{remove}(a, x :: L) = \text{if } a = x \text{ then } \text{remove}(a, L) \text{ else } x :: \text{remove}(a, L)
\]