

Homework-4

Compilers, Monsoon-2020, IIIT-H
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1. Read Sections 7.10 to 7.14 from the Chapter on Linkers from the book *Computer Systems: A Programmer's Perspective*. Solves Problems 7.12 and 7.15.
2. Read the one page handout on Context Free Grammars and Ambiguity posted on elearn@IIITH. Prove that if a grammar is parse tree-ambiguous then it is right-ambiguous.
3. Consider the following definition of regular expressions defined over an alphabet Σ .
 - (a) Any $a \in \Sigma$ is a regular expression.
 - (b) If r is a regular expression, then r^* is a regular expression.
 - (c) If r_1 and r_2 are regular expressions, then $r_1 + r_2$ is a regular expression.
 - (d) If r_1 and r_2 are regular expressions, then $r_1 \cdot r_2$ is a regular expression.
 - (e) If r is a regular expression, then (r) is regular expression.

Examples of regular expressions over an alphabet $\Sigma = \{a, b\}$: a , a^* , $a \cdot b$, $a \cdot (a + b)^*$. Further $*$ operator has the highest precedence followed by \cdot and $+$ operators. Construct an intuitive context free grammar describing the set of all regular expressions over the alphabet $\Sigma = \{a, b\}$. Check if the grammar is ambiguous and prove the same if it is the case. Now rewrite the CFG eliminating the ambiguities.