

Team Assignment 1: Chapter 2. Languages

Due Tuesday, January 19

Names: _____ Section: — Score: /50 pts

1. [10 pts] Let L be the language over the alphabet $\{a, b\}$ defined by
 - (i) Basis: $\lambda \in L$.
 - (ii) Recursion: If $u \in L$ and $u = xyz$, then $xaybz \in L$ and $xbyaz \in L$.
 - (iii) Closure: A string $u \in L$ only if u can be obtained by a finite number of applications of the recursive step.

Describe L (Example 2.2.3 on page 46), i.e., what are the strings in L ?

2. [16 pts] Give a recursive definition of the set of strings over $\{a, b\}$ that contains twice as many a 's as b 's. (Problem 8 on page 59).
3. [2 pts] *True or False.* $\{\lambda\}$, the language consisting of only the *null string*, is a language over any alphabet.
4. [2 pts] *True or False.* \emptyset , the *empty language*, is a language over any alphabet.
5. Give a regular expression that represents each of the following described sets:
 - (a) [10 pts] The set of strings over $\{a, b\}$ in which every a is either *immediately preceded* or *immediately followed* by b , e.g., $baab$, aba , and b . (Problem 28 on page 60)
 - (b) [10 pts] The set of strings over $\{a, b\}$ that do not contain the substring aaa . (Problem 31 on page 60)