

Name: _____ Section (circle one): 01 (9:00) 02 (9:55) 03 (10:45)

This quiz, is due at the beginning of the second day of class. Please either print it and complete it by hand, or complete it electronically and then print it. A lot of this reading material should be familiar; some of Elaine Rich's notation may be different than you have seen before; you need to understand and use her notation. This quiz is mostly about definitions and notation. **Please print 2-sided.**

Chapter 2.

1. We consistently use the symbol Σ to denote the _____ from which we compose strings.

According to the textbook's definition, can Σ ever be infinite?

According to the textbook's definition, can a string have infinite length?

Σ^* is the _____ of all strings **including the empty string** whose symbols come from Σ .

2. Let Σ be $\{a, b, c\}$, and let $s \in \Sigma^*$ be $abcbcc$. What is the value of each of the following expressions?

$|s|$

sa

s^0

s^2

s^R

$\#_b(s)$

How many different proper prefixes does s have?

How many different proper substrings does s have?

3. A (formal) *language* is a _____ of strings over an _____.
4. Are \emptyset and $\{\epsilon\}$ the same language? Explain briefly.
5. If the ordering of the symbols in $\{a, b, c\}$ is the order given here, arrange the following strings into lexicographic order, according to the textbook's definition: b ba abc cac ϵ ab
6. If $L_1 = \{a, ab\}$ and $L_2 = \{a, c, \epsilon\}$, how many *different* strings are in the language L_1L_2 ? _____

7. If $L = \emptyset$, what is L^* ? _____
8. Give an example of a language L for which $L^+ \neq L^* - \{\epsilon\}$. $L =$ _____
9. Consider Exercise 2.2 On page 19. List here the letters (chosen from $\{a, b, c, d\}$) of the given strings that are in $L_1 L_2$: _____

2) Let $L_1 = \{a^n b^n : n > 0\}$. Let $L_2 = \{c^n : n > 0\}$. For each of the following strings, state whether or not it is an element of $L_1 L_2$:

a) ϵ .	No.
b) aabbcc.	Yes.
c) abbcc.	No.
d) aabbccccc.	Yes.

10. Can a language (set of strings over an alphabet) ever be uncountably infinite?
11. What are the possibilities for the cardinality of the set of all languages over a given alphabet ?
- Answer: _____ and _____
12. What is the relationship between $\{0\}^* \{1\}^*$ and $\{01\}^*$? (circle one)

= \subset \supset

Good problems to think about, but not to turn in (not yet, some may be assigned later):

Exercises 2.3, 2.5a, 2.7abde, 2.8