CSCI 4220 Quiz 1
– Syntax –

Instructions

The following quiz contains multiple choice as well as multiple answer questions. A multiple choice question will have exactly one correct answer. A multiple answer question may have one or more correct answers.

On the blackboard there will be an image of this quiz. That is, a quiz having the same questions, same answers, and same order of questions and answers. In order to get credit for taking this quiz, you will need to enter your answers for this quiz on the blackboard. The blackboard will then record your grade for the quiz.

Problem 1. (10 points)

True or False. Is the following grammar ambiguous?

A ::= A B | ϵ
B ::= c | A

Problem 2. (10 points)

Consider the following grammar.

S ::= a B b | b C a
B ::= a B | B b | D
C ::= b C | C a | D
D ::= x

Which of the following strings can NOT be generated by the grammar?

1. aabx
2. aaxbbb
3. aaabxbb
4. bbxaaaa

Problem 3. (10 points)

Consider the following ambiguous grammar.

S ::= B | C
B ::= a B | B b | D
C ::= b C | C a | D
D ::= x

Which of the following strings can NOT be generated by the grammar?

1. aaaaax
2. x
3. xbbb
4. bbbx
5. axbaa
6. bbbxaaaa
7. none of the above (they can all be generated)

Problem 4. (10 points)

Consider the following ambiguous grammar:

S ::= S S | a

How many different parse trees are there for the string aaaa?

Problem 5. (10 points)

Consider the following BNF grammar:

S ::= A x | B y
A ::= B y | C w
B ::= x | B w
C ::= y

Which of the following regular expressions describes the same set of strings as the grammar?

1. xwxy + xww*y + ywx
2. xwx + xww*y + yw

3. xw*y + xwxyx + ywx
4. xwy + xw*xyx + ywx
5. xw*y + xw*yx + ywx
6. none of the above
7. all of the above

Problem 6. (10 points)

Let R denote the following regular expression: (ab + abb)*bbab. Which of the following strings (i.e., tokens) is NOT in the set denoted by R?

1. ababab
2. abbbab
3. abbabbbab
4. ababbabbbab
5. abbabbabbbab
6. none of the above, they are all in R

Problem 7. (10 points)

Consider the regular expression (ab)*a. Another regular expression that defines the same set of tokens is:

1. a(ba)*
2. a*(ba)*
3. a*ba
4. Both 1 and 2
5. There is only one regular expression that can define this set of tokens.

Problem 8. (10 points)

Consider the following ambiguous grammar.

S	::=	B | C
B	::=	a B | B b | D
C	::=	b C | C a | D
D	::=	x

Which of the following regular expressions describes the same set of strings?

1. (a + aa)*xb* + (b + bb)*xa*
2. (aa*)*xb* + (bb*)*xa*
3. a*xb* + b*xa*
4. all of the above
5. none of the above

Problem 9. (10 points)

True or False. Does the following equality hold?

$$1 + 0(\epsilon + 00)^*(1 + 01) = 0^*1$$

Problem 10. (10 points)

True or False. Does the following equality hold?

$$(\epsilon + 11) + (0 + 10)(\epsilon + 00)^*(1 + 01) = \epsilon + (0 + 1)0^*1$$