Homework quiz 10

Due Apr 16 at 11:59pm **Points** 10 **Questions** 5 **Available** until Apr 16 at 11:59pm
Time Limit None **Allowed Attempts** Unlimited

Instructions

This "quiz" is your graded homework for the week. Some of it can be done based solely on the materials found on Canvas, while other parts may require lecture material.

I suggest you consume the Canvas material as early as possible and attempt as many problems as you can, and then return to finish after lecture and/or office hours fills in any gaps in your understanding.

You are welcome to take the quiz alone or with others. If you do work with others, it is important that answers are not simply shared but that everyone involved works to understand the solution and could do similar problems alone in the future.

The quiz is untimed and may be taken multiple times. Your highest score achieved before the deadline is the one that will get recorded.

Take the Quiz Again

Attempt History

	Attempt	Time	Score
KEPT	Attempt 3	5 minutes	10 out of 10
LATEST	Attempt 3	5 minutes	10 out of 10
	Attempt 2	14 minutes	9.33 out of 10
	Attempt 1	18 minutes	6 out of 10

Correct answers are hidden.

Score for this attempt: **10** out of 10
Submitted Apr 6 at 3:47pm
This attempt took 5 minutes.

Question 1

2 / 2 pts

Consider the context-free grammar S → (S)S | λ

Give a leftmost derivation of the string "(())"

Your derivations should begin with S, end with (()), and only make one substitution per step. Do not include any spaces, quotes, or lambdas in your answer. Use the ">" character to represent the right arrow. For example, S>aSb>ab might be a legal derivation for a string in another language.

Hint: > should appear five times in your answer.

S>(S)S>((S)S)S>(()S)S>(())S>(())

Question 2

2 / 2 pts

Consider the ambiguous grammar

S → BC | λ
B → bbB | C | λ

C → cC | c

What is the shortest string in L(S) that can be used to show the grammar is ambiguous? Write the string without any spaces or quotation marks.

cc

Now show the grammar ambiguous by giving two derivations for the string (each derivation should have a particular important property learned in class). Give the two shortest derivations you can find. Write the derivation that uses the fewest characters in the first box (for autograding purposes).

S>BC>C>cC>cc

S>BC>CC>cC>cc

Your derivations should begin with S, end with your chosen string, and only make one substitution per step. Do not include any spaces, quotes, or lambdas in your answer. Use the ">" character to represent the right arrow. For example, S>aSb>ab might be a legal derivation for a string in another language.

Answer 1:

cc

Answer 2:

S>BC>C>cC>cc

Answer 3:

S>BC>CC>cC>cc

Question 3

2 / 2 pts

The language L = { $a^n b^m$ | n > m } can be represented by a context-free grammar with three productions. Give the two missing productions by filling in the blanks below.

S → aS | aSb | a

Put the shorter answer in the first blank. Do not include any spaces in your answer.

Hint: The first blank should have two characters and the second should have three.

Answer 1:

aS

Answer 2:

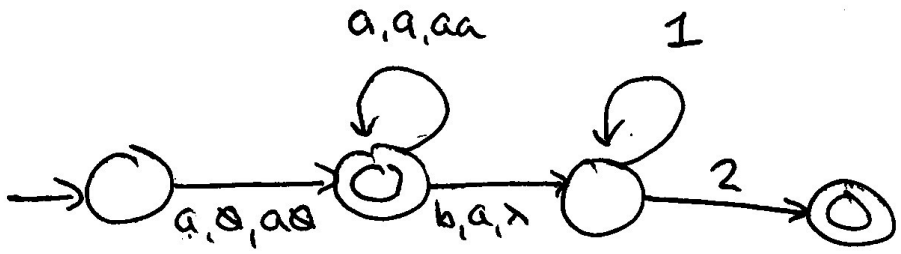
aSb

Question 4

2 / 2 pts

Below is a nearly complete PDA for the language L = { $a^n b^m$ | n > m }. Two more triples are needed to finish it, on the transition arrows labeled "1" and "2". In the boxes write the triples that will complete the PDA.

If you need a lambda, type exactly the word "lambda". If you need the empty stack symbol, type exactly the word "emptystack". Do not include any spaces in your answer.



1: b,a,lambda

2: lambda,a,lambda

Answer 1:

b,a,lambda

Answer 2:

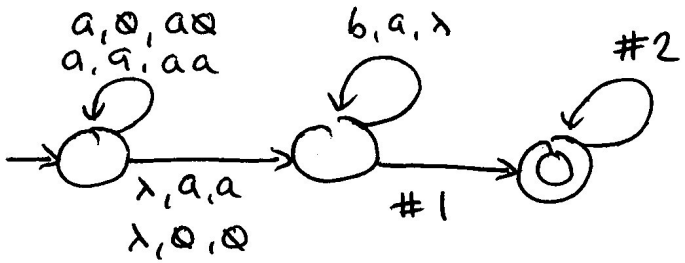
lambda,a,lambda

Question 5

2 / 2 pts

The following PDA is supposed to recognize the language L = { $a^m b^n$ | n > m }. It can be completed in two more triples, one at each of the arrows labeled 1 and 2.

Write a pair of triples to finish the PDA. Do not write any spaces. If you need a lambda or empty stack symbol, write exactly "lambda" or "emptystack" in its place



1: b,emptystack,empty

2: b,emptystack,empty

Answer 1:

b,emptystack,emptystack

Answer 2:

b,emptystack,emptystack

Quiz Score: **10** out of 10