CST 334: Operating Systems

Dr. Glenn Bruns

# BNF problems

**Instructions.** Answer the following question by editing [bnf.txt](https://drive.google.com/file/d/1iqtfKIPxaowCjLIeJXTki52M8bJBhnkw/view?usp=sharing).Here is a simple grammar:

A ::= A A + | A A \* | **b**

The terminal symbols are +, \*, and **b**. A is the only non-terminal symbol. All the productions for A are shown on one line to save space.

1. (Y/N) Can the string "**bb**+" be derived from this grammar?
2. (Y/N) Can the string "**bb**\*\*" be derived?
3. (Y/N) Can the string "**bb**\***b**+" be derived?
4. (Y/N) In any string derived from the grammar, is it true that the number of **b**'s will be greater than the number of + and \* symbols combined?

Here's a slightly-more complicated grammar:

A ::= 0 B | 1 C | "" ( "" means the empty string)

B ::= 0 A | 1 C

C ::= 0 A | 1 B

A, B, and C are non-terminals (obviously), and 0 and 1 are terminals. A is the start symbol. The empty string isn't a terminal symbol -- it is a string containing no terminals or non-terminals.

1. (Y/N) Can the string "111" be derived?
2. (Y/N) Can the string "001" be derived from this grammar?
3. (Y/N) Can the string "010" be derived?

Let's try a grammar related to programming languages.

func-def ::= **function** **id** ( id-list ) { stmts }

stmts ::= stmts stmt | stmt

stmt ::= **print** expr | **id** ( expr ) | **id** = expr | **return** expr

id-list ::= "" | **id** id-list1

id-list1 ::= "" | , **id** id-list1

expr ::= **id** | **num** | expr + expr | id ( expr )

It should be clear which symbols are terminals and non-terminals. Non-terminal func-def is the start symbol.

1. (Y/N) Can the following function definition be derived from this grammar?

function bar() {

print 5

}

1. (Y/N) Can the following function definition be derived?

function baz(x,y) {

z = foo(x,y)

return z

}

1. (Y/N) Can the following function definition be derived?

function g(x,y) {

baz(x)

print y

}

**Submitting.** Submit your edited bnf.txt on iLearn.

**Grading**. Each question is worth 3 points.