

# CS536 Homework 5

## Due by 11:00 PM on Tuesday Mar 03 2020

Homework assignments must be done individually. Collaboration on homework assignments is *not* allowed.

### Questions

This homework is about the language of *set expressions* defined as follows:

1. A comma-separated list of zero or more names enclosed in curly braces is a set expression.
2. If  $S1$  and  $S2$  are both set expressions, then so are each of the following:

$S1 \cup S2$   
 $S1 \cap S2$   
 $S1 - S2$   
 $(S1)$

In a set expression, parenthesis has the highest precedence; intersection and union have the same, second highest precedence; subtraction has the lowest precedence. Intersection, union and subtraction are all left associative.

the following table are tokens for terminals:

NAME	// one name in a set
U	// union
$\cap$	// intersection
-	// minus
(	// left paren
)	// right paren
{	// left curly brace
}	// right curly brace
,	// comma

This time you are not required to write CFG for this language, some CFGs are offered below. For each CFG, do the following check:

- a. If there exists one string that is a legal set expression (given our definition above), but is not in the language of the CFG, give one example.
- b. If there exists one string that is not a set regular expression (given our definition above), but is in the language of the CFG, give one example.
- c. If the CFG is ambiguous, drawing two different parse trees for some string in the language of the CFG.
- d. If the CFG is correct, claim "It is correct".

Note that the terminals are LPAREN, RPAREN, MINUS, UNION, INTERSECT, LCURLY, RCURLY, COMMA and NAME.

#### CFG 1:

```

exp → exp MINUS term | term
term → term UNION factor | term INTERSECT factor | LPAREN exp RPAREN | factor
factor → LCURLY list RCURLY
list → NAME | list COMMA NAME

```

#### CFG 2:

```

exp → LCURLY RCURLY | LCURLY list RCURLY | term
term → term MINUS factor | factor
factor → factor UNION set | factor INTERSECT set | set
set → LPAREN set RPAREN | exp
list → epsilon | NAME | list COMMA NAME

```

#### CFG 3:

```

exp → exp MINUS term | term
term → term UNION factor | term INTERSECT factor | LPAREN exp RPAREN | factor
factor → LCURLY RCURLY | LCURLY list RCURLY
list → NAME | list COMMA NAME

```

#### CFG 4:

```

exp → exp MINUS term | term
term → factor UNION factor | term INTERSECT factor | factor
factor → LPAREN exp RPAREN | LCURLY RCURLY | LCURLY list RCURLY
list → NAME | list COMMA NAME

```

#### CFG 5:

```

exp → exp MINUS term | term
term → term UNION factor | term INTERSECT factor | factor
factor → LPAREN exp RPAREN | LCURLY RCURLY | LCURLY list RCURLY
list → list COMMA NAME | NAME

```

### Handing in

Homework is to be submitted on Canvas. Please make sure that you submit the correct homework.