

Homework 1 Syntax: EBNF Grammar

Legend

- - denotes main problem #'s
- - parse tree
- - denotes sub-problems

1. Q is valid $\langle id \rangle ::= \langle letter \rangle \{ (\langle letter \rangle | \langle digit \rangle)^* \}$

id
letter
Q

4b is invalid! starts with the digit four. Must start with a letter for identifiers.

a1Bc is valid

id
letter
a
digit
1
letter
B
letter
c

X_1 is invalid because it contains an underscore "_" not allowed in identifier rules.

2. 44 is valid

expr
number
digit
44

-44 is valid

expr
number
digit
44

0.5 is valid

expr
number
digit
0
digit
5

.5 is not valid decimal must have at least one digit before.

5. is valid

expr
number
digit
5

-2 is not valid decimals must have at least one digit before.

--9 is not valid Multiple "-" signs are not allowed

E4 is not valid must have a number before E.

-3e2 is valid

expr
number
digit
3
exp
e2

-3.1e2.5 is not valid because extra decimal after exponent is invalid.

3. x is valid

expr
id
letter
x

(x) is valid

expr
(expr)
id
letter
x

(-x) is valid

expr
(expr)
op
id
letter
x

(x+1) is valid

expr
(expr)
id
letter
x
op
+
expr
number
digit
1

(+x1) is invalid, the operator is at the beginning it must be in the middle.

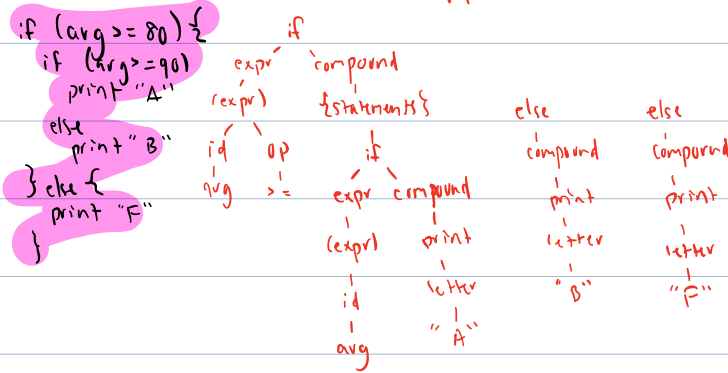
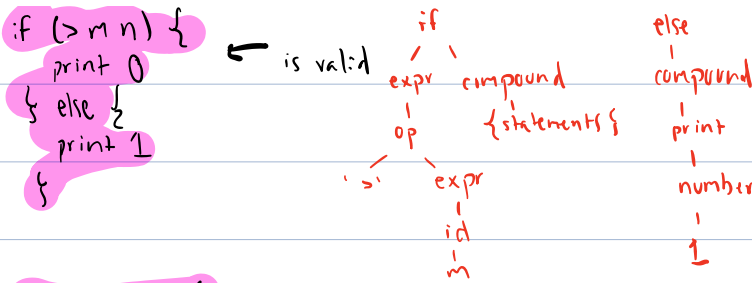
(-x1) is invalid, the operator is at the beginning it must be in the middle.

4. if (== xy) {
print "eq"
}

← this is invalid because == is a comparison operator that should have two operands (example, x == y) but it's missing the second operand.

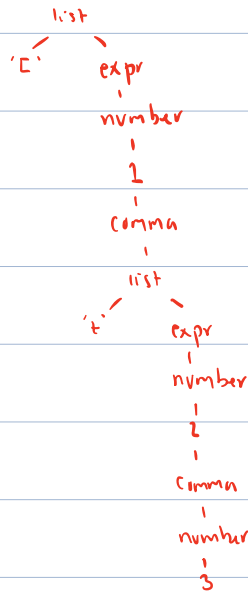
if true {
else {

← is invalid because the condition true is missing parentheses around the expression



5. No it's not valid to mix types in a list. According to the SILLY grammar, a list can only contain expressions of the same type, and a string "foo" and a number 3 are different types. Therefore it is invalid

6. yes it is valid



7. the shortest assignment statement in terms of tokens

is $x=1$, x (1 token), $=$ (1 token), 1 (1 token)
total of 3 tokens.

8. shortest possible while statement while 1 {} a total of 4 tokens.

9. shortest possible function declaration is func f() {}
total of 5 tokens.