ECS 140A Homework 2

Jones, Hardy
999397426
Professor Olsson
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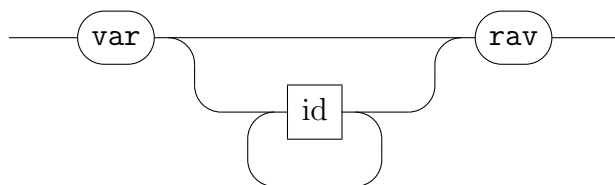
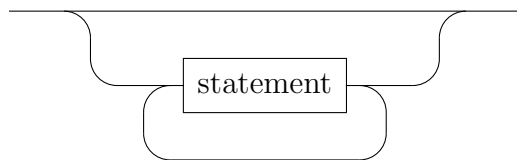*program*

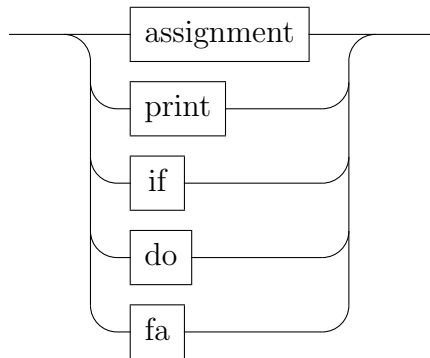```
—| block |—
```

*block*

```
—| declarations |—| statementList |—
```

declarations

```
—( var )——————( rav )—
        └—| id |—┘
```

statementList

```
    ┌———————————┐
    └—| statement |—┘
```

statement

```
—┬—| assignment |—┬—
 ├—| print |———┤
 ├—| if |———————┤
 ├—| do |———————┤
 └—| fa |———————┘
```

assignment

```
—| id |—( := )—| expression |—
```

print

(print)─ expression

if

(if)─ guardedCommands ─(fi)

do

(do)─ guardedCommands ─(od)

fa

(fa)─ id ─(:=)─ expression ─(to)─ expression ─(st)─ expression ─ commands ─(af)
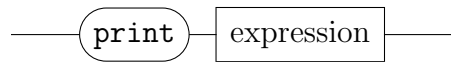
guardedCommands

guardedCommand ──────── (else)─ commands

([])─ guardedCommand

guardedCommand

expression ─ commands

commands

(->)─ block

expression

simple ─ relop ─ simple

simple

term

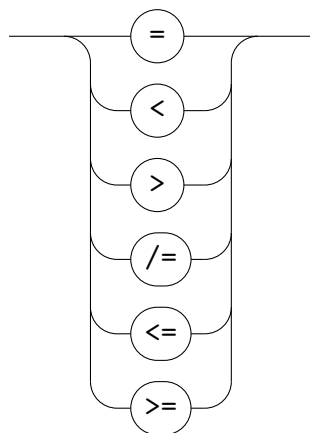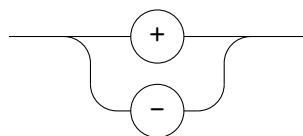addop ─ term
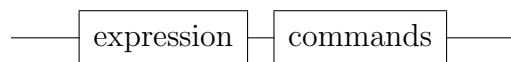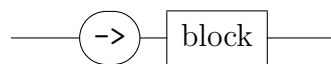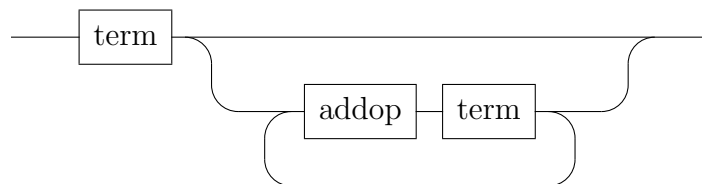
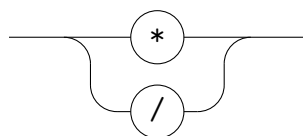*term*
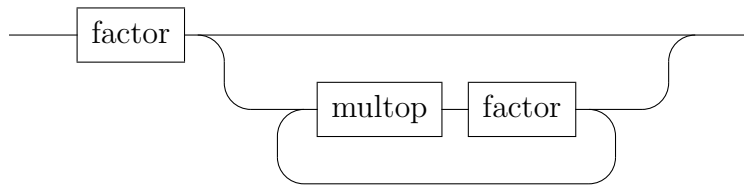
factor
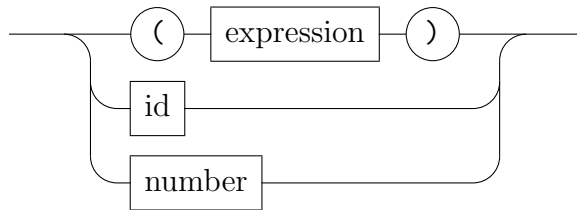
relop

addop

multop

First sets:

$$
\begin{aligned}
First(program) &= First(block)\\
&= First(declarations) \cup First(statementList)\\
&= \{var\} \cup First(statementList)\\
&= \{var\} \cup First(statement)\\
&= \{var\} \cup First(assignment) \cup First(print) \cup First(if) \cup First(do) \cup First(fa)\\
&= \{var\} \cup First(id) \cup \{print\} \cup \{if\} \cup \{do\} \cup \{fa\}\\
&= \{var\} \cup \{id\} \cup \{print\} \cup \{if\} \cup \{do\} \cup \{fa\}\\
&= \{var, \{id\}, print, if, do, fa\}
\end{aligned}
$$