CS421 HW09

Weiyang Pan – pan30

(Teamed with Yifang Zhang – zhang303)
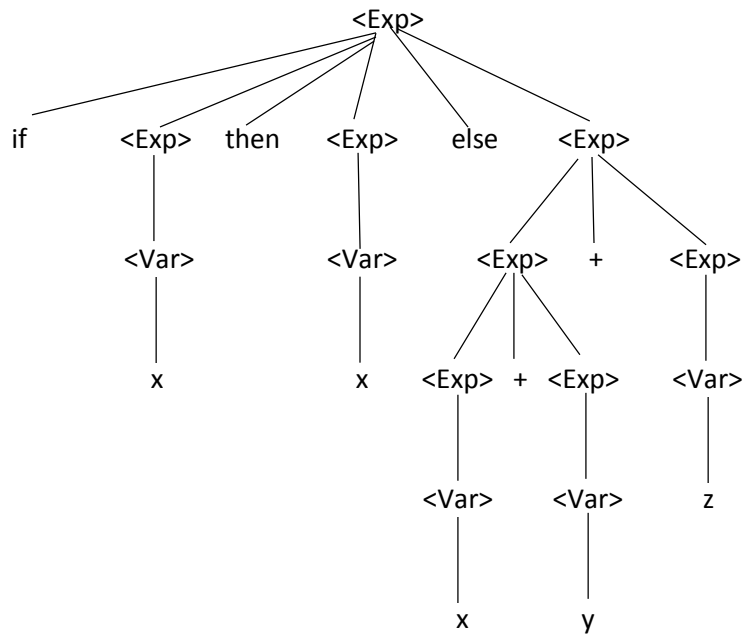
Problem 1.
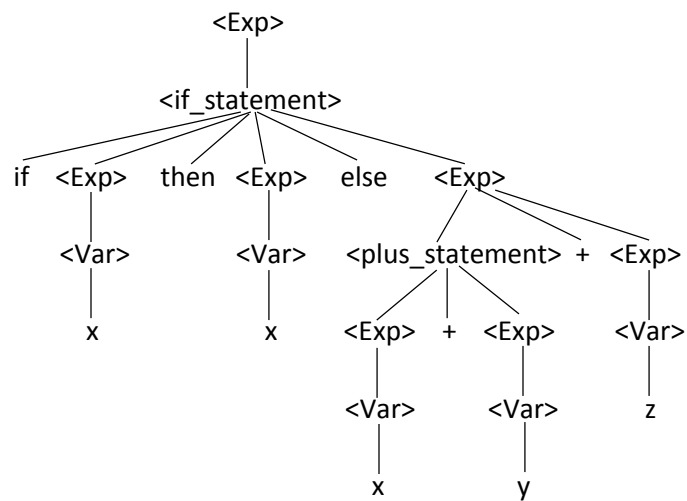
a) First parse tree:

Second parse tree:
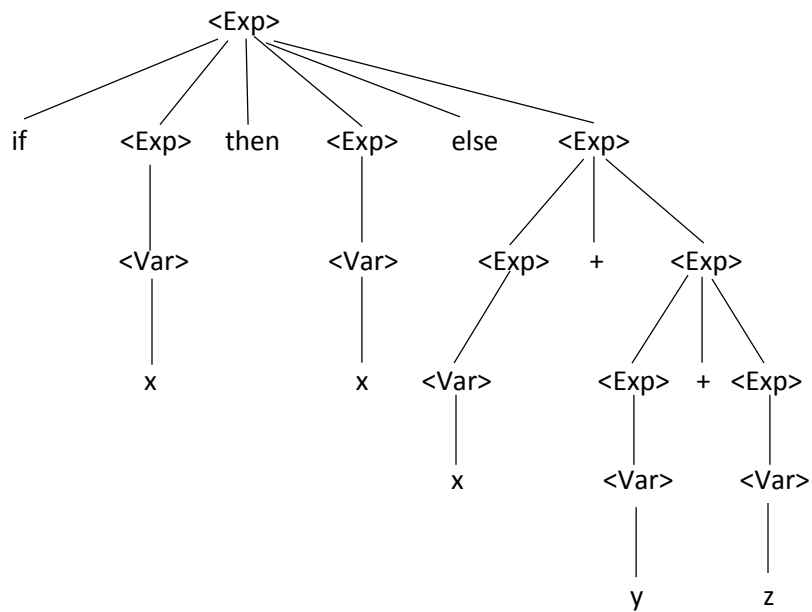
Third parse tree:
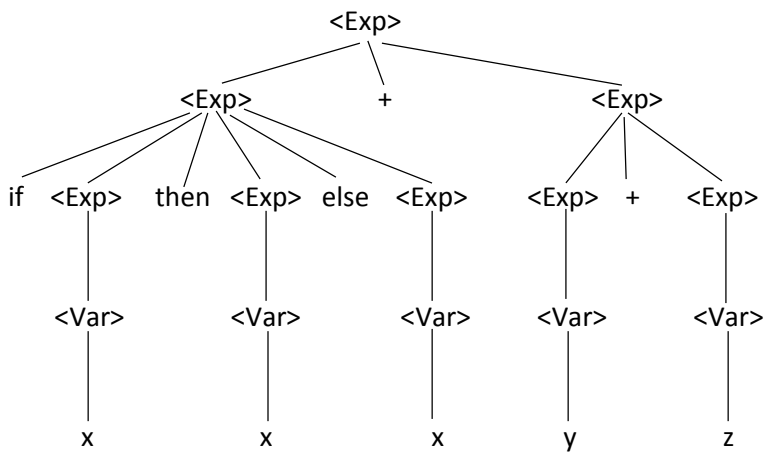
```
                          <Exp>
            ┌───────────────┼───────────────────┐
         <Exp>              +                  <Exp>
    ┌──────┬────┬──────┬──────┐          ┌──────┬──────┐
   if   <Exp>  then <Exp> else <Exp>   <Exp>   +    <Exp>
          │          │          │        │          │
        <Var>      <Var>      <Var>    <Var>      <Var>
          │          │          │        │          │
          x          x          x        y          z
```

b) <Exp> ::= <if_statement> | <plus_statement> + <exp> | <var>
    <plus_statement> ::= <Var> + <Var>
    <if_statement> ::= if <Exp> then <Exp> else <Exp>
    <Var> ::= x | y | z

c) Parse Tree:

```
                        <Exp>
                          │
                   <if_statement>
          ┌──────┬────┬──────┬──────┬──────────────┐
         if   <Exp>  then <Exp> else             <Exp>
                │          │              ┌─────────┴──────┐
              <Var>      <Var>     <plus_statement>  +  <Exp>
                │          │        ┌──────┬──────┐        │
                x          x      <Exp>   +   <Exp>     <Var>
                                    │          │          │
                                  <Var>      <Var>        z
                                    │          │
                                    x          y
```

Problem 2:

Stack	Current String	Action to be taken
Empty	lzpor[eof]	Initialize stack, go to state 1
st1	lzpor[eof]	Shift l, go to state 5
st1::l::st5	zpor[eof]	Shift z, go to state 3
st1::l::st5::z::st3	por[eof]	Reduce by rule 3, go to state 7
st1::l::st5::<t>::st7	por[eof]	Shift p, go to state 9
st1::l::st5::<t>::st7::p::st9	or[eof]	Shift o, go to state 4
st1::l::st5::<t>::st7::p::st9::o::st4	r[eof]	Reduced by rule 4, go to state 7
st1::l::st5::<t>::st7::p::st9::<t>::st7	r[eof]	Reduced by rule 1, go to state 11
st1::l::st5::<t>::st7::p::st9::<e>::st11	r[eof]	Reduced by rule 2, go to state 8
st1::l::st5::<t>::st8	r[eof]	Shift r, go to state 10
st1::l::st5::<t>::st8::r::st10	[eof]	Reduced by rule 5, go to state 7
st1::<t>::st7	[eof]	Reduced by rule 1, go to state 2
st1::<t>::st2	[eof]	Accept!