Lab Four

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1 Exercise 4.9

```
1 S  → a S e
2    | B
3 B  → b B e
4    | C
5 C  → c C e
6    | d
```

1.1 *First* Set for Non-terminals

$First$(C):
1 (c C E) = {c}
2 (d) = {d}
Final Answer: {d,c}

$First$(B):
1 (b B e) = {b}
2 (C) = {d,c}
Final Answer: {d,c,b}

$First$(S):
1 (a S e) = {a}
2 (B) = {d,c,b,}
Final Answer: {d,c,b,a}

1.2 *Follow* Set for Non-terminals

Follow(C):
1 B → <u>C</u> = { }
2 C → c <u>C</u> e = {e}
Final Answer: {e}

Follow(B):
1 S → <u>B</u> = { }
2 B → b <u>B</u> e = {e}
Final Answer: {e}

Follow(S):
1 S → a <u>S</u> e = {e}
Final Answer: {e}

2 Exercise 5.10

```
1 S      → Stmt $
2 Stmt → if expr then Stmt else Stmt
3        |  if expr then Stmt
4        |  other
```
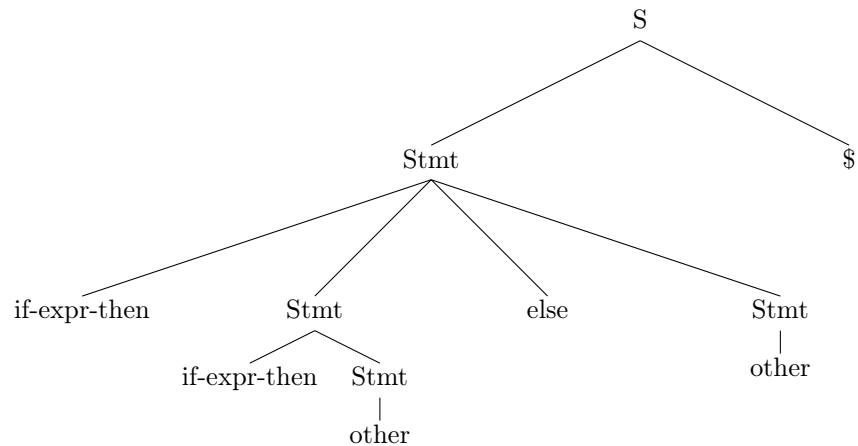
if expr then if expr then other else other

2.1 First Parse Tree

2.2 Second Parse Tree

```
                                    S
                          ┌─────────┴─────────┐
                        Stmt                   $
                   ┌──────┴──────┐
             if-expr-then       Stmt
                        ┌────────┬──┴──┬────────┐
                  if-expr-then  Stmt  else     Stmt
                                 │               │
                               other           other
```
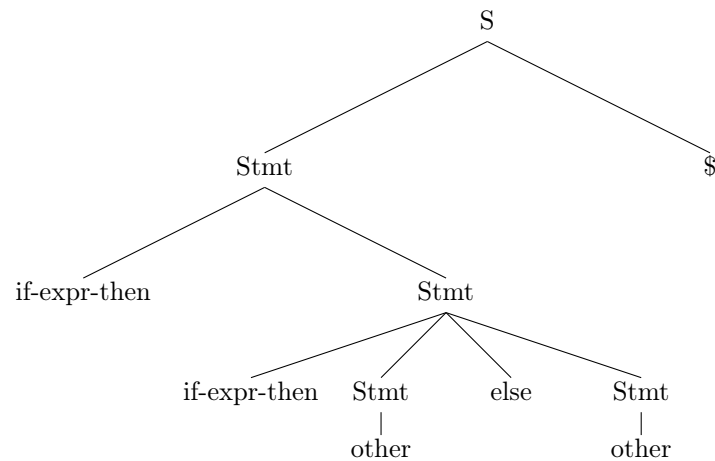
3 Exercise 4.4.3

S -> SS+ | SS* | a

3.1 *First* and *Follow* Sets for Non-terminals

First(S):
1 (S S +) = {+,a,*}
2 (S S *) = {+,a,*}
3 (a) = {a}
Final Answer: {+,a,*}

Follow(S):
1 S → $\underline{S}$ $\underline{S}$ + = {*,+,a}
2 S → $\underline{S}$ $\underline{S}$ * = {+,*,a}
Final Answer: {+,*,a}