```
Modified Tiny-C BNF - Original
                                                             Modified Tiny-C BNF - Removing ELSE Statements
cprogram> ::= <statement_list>
                                                             cprogram> ::= <statement_list>
<statement_list> ::= <statement> SC <statement_list> | ∈
                                                             <statement_list> ::= <statement> SC <statement_list> | ∈
<statement> ::= <if_statement> |
                                                             <statement> ::= IF <paren_expr> <statement> |
              WHILE <paren_expr> <statement> |
                                                                            WHILE <paren expr> <statement> |
              DO <statement> WHILE <paren_expr> |
                                                                            DO <statement> WHILE <paren expr> |
              <expr> |
                                                                            <expr> |
              SC
                                                                            SC
<if_statement> ::= IF <paren_expr> <statement>
                                                             <paren_expr> ::= LP <expr> RP
<else_clause> ::= ELSE <statement> | ∈
                                                             <expr> ::= <test> | id ASGN <expr>
<paren_expr> ::= LP <expr> RP
                                                             <test> ::= <sum> <test_opt>
<expr> ::= <test> | id ASGN <expr>
                                                             <test_opt> ::= COMPARE <sum> | ∈
<test> ::= <sum> <test opt>
                                                             <sum> ::= <term> <sum opt>
<test opt> ::= COMPARE <sum> | ∈
                                                             <sum opt> ::= ADD <term> <sum opt> | SUB <term>
<sum> ::= <term> <sum_opt>
                                                             <sum_opt> | ∈
<sum_opt> ::= ADD <term> <sum_opt> | SUB <term>
                                                             <term> ::= id | num | <paren_expr>
<sum opt> | ∈
<term> ::= id | num | <paren_expr>
```

```
Modified Tiny-C BNF - Removing ELSE Statements
                                                            Modified Tiny-C BNF - Moving ASGN production to the top
                                                            cprogram> ::= <statement_list>
cprogram> ::= <statement_list>
<statement list> ::= <statement> SC <statement list> | ∈
                                                            <statement_list> ::= <statement> SC <statement_list> | ∈
<statement> ::= IF <paren_expr> <statement> |
                                                            <statement> ::= IF <paren_expr> <statement> |
              WHILE <paren_expr> <statement> |
                                                                           WHILE <paren_expr> <statement> |
              DO <statement> WHILE <paren_expr> |
                                                                           DO <statement> WHILE <paren_expr> |
              <expr>
                                                                           id ASGN <expr>
              SC
                                                                           SC
                                                            <paren_expr> ::= LP <expr> RP
<paren expr> ::= LP <expr> RP
<expr> ::= <test> | id ASGN <expr>
                                                            <expr> ::= <test>
<test> ::= <sum> <test_opt>
                                                            <test> ::= <sum> <test_opt>
<test_opt> ::= COMPARE <sum> | ∈
                                                            <test_opt> ::= COMPARE <sum> | ∈
<sum> ::= <term> <sum opt>
                                                            <sum> ::= <term> <sum opt>
<sum_opt> ::= ADD <term> <sum_opt> | SUB <term>
                                                            <sum_opt> ::= ADD <term> <sum_opt> | SUB <term>
                                                            <sum_opt> | ∈
<sum_opt> | ∈
<term> ::= id | num | <paren_expr>
                                                            <term> ::= id | num | <paren_expr>
```

```
Parsing table
```

```
cprogram> ::= <statement_list> 1
<statement_list> ::= <statement> SC <statement_list> | 2
                  ∈ 3
<statement> ::= IF <paren_expr> <statement> | 4
              WHILE <paren_expr> <statement> | 5
              DO <statement> WHILE <paren_expr> | 6
              id ASGN <expr> | 7
              SC 8
<paren_expr> ::= LP <expr> RP 9
<expr> ::= <test> 10
<test> ::= <sum> <test_opt> 11
<test_opt> ::= COMPARE <sum> 12
             | ∈ 13
<sum> ::= <term> <sum_opt> 14
<sum_opt> ::= ADD <term> <sum_opt> | 15
             SUB <term> <sum_opt> | 16
             € 17
<term> ::= id | 18
          num | 19
          <paren_expr> 20
```

| | num | id | SUB | ADD | COMP | RP | LP | SC | ASGN | WHILE | DO | IF | \$ |
|--|-----|----|-----|-----|------|----|----|----|------|-------|----|----|----|
| <pre><pre><pre><pre><pre><pre><pre><pre></pre></pre></pre></pre></pre></pre></pre></pre> | | 1 | | | | | | 1 | | 1 | 1 | 1 | 1 |
| <statement_list></statement_list> | | 2 | | | | | | 2 | | 2 | 2 | 2 | 3 |
| <statement></statement> | | 7 | | | | | | 8 | | 5 | 6 | 4 | |
| <pre><paren_exp></paren_exp></pre> | | | | | | | 9 | | | | | | |
| <expr></expr> | 10 | 10 | | | | | 10 | | G. | .27 | | | |
| <test></test> | 11 | 11 | | | | | 11 | | 3 | | | | |
| <test_opt></test_opt> | | | | | 12 | 13 | | 13 | | 13 | | | |
| <sum></sum> | 14 | 14 | | | | | 14 | | | | | | |
| <sum_opt></sum_opt> | | | 16 | 15 | 17 | 17 | | 17 | | 17 | | | |
| <term></term> | 19 | 18 | | | | | 20 | | ii. | | | | |