E04: Context-free grammars

solutions

E04-1: Solution:

    (a) `stmts → (stmt ";")*`

    (b) `stmts → stmt (";" stmt)*`

    (c) `stmts → [stmt (";" stmt)*]`

E04-2: Solution:

    (a) `stmts → stmt ";" stmts`
        `stmts → ε`

    (b) `stmts → stmt morestmts`
        `morestmts → "," stmt morestmts`
        `morestmts → ε`

    (c) `stmts → stmt morestmts`
        `stmts → ε`
        `morestmts → "," stmt morestmts`
        `morestmts → ε`

E04-3: Solution:

    (a) `"((()))"`, `"(())()"`, `"()(())"`, `"()()()"`, `"(()())"`

    (b) `"()()()"`

E04-4: Solution:

        `S → "(" S ")" S`
        `S → ε`

E04-5: Solution:

```
E → T ( "||" T )*
T → F ( "&&" F)*
F → "!" F | ID
```

E04-6: Solution:

```
CallStmt   → ID "(" ArgList ")"
ArgList    → ε
ArgList    → Expr MoreExprs
MoreExprs  → ε
MoreExprs  → "," Expr MoreExprs
```

E04-7: Solution:

```
S → "b" A
S → "a" B
A → "a" A
A → ε
B → "a" B
B → "b" C
C → ε
```

E04-8: Solution:

(a) {"a", "b", "*", "(", ")", "|"}

(b)
```
expr → term ("|" term)*
term → factor term*
factor → "a" | "b" | factor "*" | "(" expr ")"
```