prog → prog \n stmt | stmt

stmt → cond | loop | assign | alloc | func

alloc → VAR ‘ ‘ ID

shape\_functions → LINE | RECTANGLE | OVAL | COMPOSITE

comp\_exp → LOCATION | SIZE | COLOR | shape\_functions

type → INT | FLOAT | STRING | BOOLEAN | ARRAY\_TYPE | comp\_exp

assign → (VAR)? ID ‘=’ assign\_tail

assign\_tail → ID | prim\_exp | comp\_exp | string\_exp

prim\_exp → int\_exp | float\_exp | boolean\_exp

int\_exp → INT int\_exp\_tail

int\_exp\_tail → OP (int\_exp | INT\_FUNCT ) | ε

float\_exp → FLOAT float\_exp\_tail

float\_exp\_tail → OP (float\_exp | FLOAT\_FUNCT) | ε

string\_exp → STRING | string\_exp + STRING\_FUNCT | STRING\_FUNCT + string\_exp | string\_exp + string\_exp

boolean\_exp → logic bool\_exp\_tail

bool\_exp\_tail → LOGICAL\_CONCAT logic bool\_exp\_tail | ε

logic → ‘!’ logic

| ID logic\_op ID

| ID logic\_op BOOL\_FUNCT

| BOOL\_FUNCT logic\_op BOOL\_FUNCT

| BOOL\_FUNCT logic\_op ID | ID | BOOL\_FUNCT