```
<program>            ::= <statement_list>
<statement_list>     ::= <statement>
                       | <statement> <statement_list>
<statement>          ::= <load_stmt>
                       | <select_stmt>
                       | <filter_stmt>
                       | <sort_stmt>
                       | <join_stmt>
                       | <groupby_stmt>
                       | <sample_stmt>
                       | <dropna_stmt>
                       | <fillna_stmt>
                       | <mutate_stmt>
                       | <apply_stmt>
                       | <describe_stmt>
                       | <summary_stmt>
                       | <outliers_stmt>
                       | <quantile_stmt>
                       | <normalize_stmt>
                       | <binning_stmt>
                       | <rolling_stmt>
                       | <hypothesis_stmt>
                       | <boxplot_stmt>
                       | <heatmap_stmt>
                       | <pairplot_stmt>
                       | <timeseries_stmt>
                       | <pie_stmt>
                       | <save_stmt>
                       | <export_plot_stmt>
                       | <info_stmt>

<load_stmt>          ::= "load" STRING_LITERAL "as" IDENTIFIER
<select_stmt>        ::= "select" IDENTIFIER <column_list_curly> "as" IDENTIFIER
<filter_stmt>        ::= "filter" IDENTIFIER "[" <condition> "]" "as" IDENTIFIER
<sort_stmt>          ::= "sort" IDENTIFIER "by" ":" <column_list_sort> "as" IDENTIFIER
<join_stmt>          ::= "join" IDENTIFIER "with" ":" IDENTIFIER "on" ":" IDENTIFIER "as"
IDENTIFIER
<groupby_stmt>       ::= "groupby" IDENTIFIER "by" ":" <column_list_curly> "agg" ":"
<agg_func_list> "as" IDENTIFIER
<sample_stmt>        ::= "sample" IDENTIFIER "n" ":" NUMERIC_LITERAL ["random"] "as"
IDENTIFIER
<dropna_stmt>        ::= "dropna" IDENTIFIER ["columns" ":" <column_list_curly>] "as"
IDENTIFIER
<fillna_stmt>        ::= "fillna" IDENTIFIER "value" ":" <literal> ["columns" ":"
<column_list_curly>] "as" IDENTIFIER
<mutate_stmt>        ::= "mutate" IDENTIFIER <mutation_list> "as" IDENTIFIER
<apply_stmt>         ::= "apply" IDENTIFIER "columns" ":" <column_list_curly> "function" ":"
STRING_LITERAL "as" IDENTIFIER
```

```
<describe_stmt>      ::= "describe" IDENTIFIER ["columns" ":" <column_list_curly>]
<summary_stmt>       ::= "summary" IDENTIFIER
<outliers_stmt>      ::= "outliers" IDENTIFIER "method" ":" IDENTIFIER "columns" ":"
<column_list_curly>
<quantile_stmt>      ::= "quantile" IDENTIFIER "column" ":" IDENTIFIER "q" ":"
NUMERIC_LITERAL
<normalize_stmt>     ::= "normalize" IDENTIFIER "columns" ":" <column_list_curly> "method"
":" IDENTIFIER "as" IDENTIFIER
<binning_stmt>       ::= "binning" IDENTIFIER "column" ":" IDENTIFIER "bins" ":"
NUMERIC_LITERAL "as" IDENTIFIER
<rolling_stmt>       ::= "rolling" IDENTIFIER "column" ":" IDENTIFIER "window" ":"
NUMERIC_LITERAL "function" ":" IDENTIFIER "as" IDENTIFIER
<hypothesis_stmt>    ::= "hypothesis" IDENTIFIER "vs" ":" IDENTIFIER "columns" ":"
<column_list_curly> "test" ":" IDENTIFIER
<boxplot_stmt>       ::= "boxplot" IDENTIFIER "columns" ":" <column_list_curly>
<heatmap_stmt>       ::= "heatmap" IDENTIFIER "columns" ":" <column_list_curly>
<pairplot_stmt>      ::= "pairplot" IDENTIFIER "columns" ":" <column_list_curly>
<timeseries_stmt>    ::= "timeseries" IDENTIFIER "x" ":" IDENTIFIER "y" ":" IDENTIFIER
<pie_stmt>           ::= "pie" IDENTIFIER "values" ":" IDENTIFIER "labels" ":" IDENTIFIER
<save_stmt>          ::= "save" IDENTIFIER "to" ":" STRING_LITERAL ["format" ":"
IDENTIFIER]
<export_plot_stmt>   ::= "export_plot" "filename" ":" STRING_LITERAL ["width" ":"
NUMERIC_LITERAL] ["height" ":" NUMERIC_LITERAL]
<info_stmt>          ::= "info" IDENTIFIER

<condition>          ::= IDENTIFIER <operator> <literal>
                     | IDENTIFIER <operator> IDENTIFIER
<operator>           ::= "==" | "!=" | "<" | ">" | "<=" | ">="
<column_list_sort>   ::= <sort_column_spec>
                     | <sort_column_spec> "," <column_list_sort>
<sort_column_spec>   ::= IDENTIFIER ["desc"]
<column_list_curly>  ::= "{" <column_names> "}"
<column_names>       ::= IDENTIFIER
                     | IDENTIFIER "," <column_names>
<agg_func_list>      ::= "{" <agg_functions> "}"
<agg_functions>      ::= <agg_function>
                     | <agg_function> "," <agg_functions>
<agg_function>       ::= IDENTIFIER ":" IDENTIFIER
<mutation_list>      ::= "{" <mutations> "}"
<mutations>          ::= <mutation>
                     | <mutation> "," <mutations>
<mutation>           ::= IDENTIFIER ":" STRING_LITERAL
<literal>            ::= STRING_LITERAL
                     | NUMERIC_LITERAL
```