

## Removal of Epsilon

- 1  $program \rightarrow \text{program id ( identifier\_list ) ; declarations subprogram\_declarations compound\_statement .}$
- 2.1  $identifier\_list \rightarrow \text{id}$
- 2.2  $identifier\_list \rightarrow identifier\_list , \text{id}$
- 3.1.1  $declarations \rightarrow \text{var id : type ; declarations}$
- 3.2.1  $declarations \rightarrow \epsilon$
- 4.1  $type \rightarrow \text{standard\_type}$
- 4.2  $type \rightarrow \text{array [ num .. num ] of standard\_type}$
- 5.1  $standard\_type \rightarrow \text{integer}$
- 5.2  $standard\_type \rightarrow \text{real}$
- 6.1.1  $subprogram\_declarations \rightarrow \text{subprogram\_declaration ; subprogram\_declarations}$
- 6.2.1  $subprogram\_declarations \rightarrow \epsilon$
- 7  $subprogram\_declaration \rightarrow \text{subprogram\_head declarations subprogram\_declarations compound\_statement}$
- 8  $subprogram\_head \rightarrow \text{function id arguments : standard\_type ;}$
- 9.1  $arguments \rightarrow ( parameter\_list )$
- 9.2  $arguments \rightarrow \epsilon$
- 10.1  $parameter\_list \rightarrow \text{id : type}$
- 10.2  $parameter\_list \rightarrow parameter\_list ; \text{id : type}$
- 11  $compound\_statement \rightarrow \text{begin optional\_statements end}$
- 12.1  $optional\_statements \rightarrow \text{statement\_list}$
- 12.2  $optional\_statements \rightarrow \epsilon$
- 13.1  $statement\_list \rightarrow \text{statement}$
- 13.2  $statement\_list \rightarrow \text{statement\_list ; statement}$
- 14.1  $statement \rightarrow \text{variable assignop expression}$
- 14.2  $statement \rightarrow \text{compound\_statement}$
- 14.3  $statement \rightarrow \text{if expression then statement}$
- 14.4  $statement \rightarrow \text{if expression then statement else statement}$
- 14.5  $statement \rightarrow \text{while expression do statement}$
- 15.1  $variable \rightarrow \text{id}$
- 15.2  $variable \rightarrow \text{id [ expression ]}$
- 16.1  $expression\_list \rightarrow \text{expression}$
- 16.2  $expression\_list \rightarrow \text{expression\_list , expression}$
- 17.1  $expression \rightarrow \text{simple\_expression}$
- 17.2  $expression \rightarrow \text{simple\_expression relop simple\_expression}$
- 18.1  $simple\_expression \rightarrow \text{term}$
- 18.2  $simple\_expression \rightarrow \text{sign term}$
- 18.3  $simple\_expression \rightarrow \text{simple\_expression addop term}$
- 19.1  $term \rightarrow \text{factor}$
- 19.2  $term \rightarrow \text{term mulop factor}$
- 20.1  $factor \rightarrow \text{id}$
- 20.2  $factor \rightarrow \text{id [ expression ]}$
- 20.3  $factor \rightarrow \text{id ( expression\_list )}$
- 20.4  $factor \rightarrow \text{num}$
- 20.5  $factor \rightarrow ( expression )$
- 20.6  $factor \rightarrow \text{not factor}$
- 21.1  $sign \rightarrow +$
- 21.2  $sign \rightarrow -$