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**QUESTION**  
Define Grammar Write on the following: I. Derivation ii. Production iii. Sentence iv. Null Symbol

**SOLUTION**

1)Derivation: A derivation is basically a sequence of production rules, in order to get the input string. During parsing, we take two decisions for some sentential form of input: Deciding the non-terminal which is to be replaced. Deciding the production rule, by which, the non-terminal will be replaced

2)Production: The productions of a grammar specify the manner in which the terminals and non-terminals can be combined to form strings. Each production consists of a non-terminal called the left side of the production, an arrow, and a sequence of tokens and/or on- terminals, called the right side of the production.

3)Sentence: A sentence is a group of character over some alphabet. A sentence is a sentential form consisting only of terminals

4)Null Symbol: a string is a finite, ordered sequence of characters such as letters, digits or spaces. The empty string is the special case where the sequence has length zero, so there are no symbols in the string. There is only one empty string, because two strings are only different if they have different lengths or a different sequence of symbols. In formal treatments,[[1]](https://en.wikipedia.org/wiki/Empty_string" \l "cite_note-1) the empty string is denoted with [ε](https://en.wikipedia.org/wiki/%CE%95) or sometimes [Λ](https://en.wikipedia.org/wiki/%CE%9B) or [λ](https://en.wikipedia.org/wiki/%CE%9B).

The empty string should not be confused with the empty language [∅](https://en.wikipedia.org/wiki/%E2%88%85), which is a [formal language](https://en.wikipedia.org/wiki/Formal_language) (i.e. a set of strings) that contains no strings, not even the empty string.

The empty string has several properties:

* |ε| = 0. Its string length is zero.
* ε ⋅ s = s ⋅ ε = s. The empty string is the [identity element](https://en.wikipedia.org/wiki/Identity_element) of the [concatenation](https://en.wikipedia.org/wiki/Concatenation) operation. The set of all strings forms a [free monoid](https://en.wikipedia.org/wiki/Free_monoid) with respect to ⋅ and ε.
* εR = ε. Reversal of the empty string produces the empty string.
* The empty string precedes any other string under [lexicographical order](https://en.wikipedia.org/wiki/Lexicographical_order), because it is the shortest of all strings.[[2]](https://en.wikipedia.org/wiki/Empty_string#cite_note-2)

In [context-free grammars](https://en.wikipedia.org/wiki/Context-free_grammar), a [production rule](https://en.wikipedia.org/wiki/Production_(computer_science)) that allows a [symbol](https://en.wikipedia.org/wiki/Symbol_(logic)) to produce the empty string is known as an ε-production, and the symbol is said to be "nullable".