*L1 = {w ∈ {a, b}\* | w possui o substring bab}*

CFG:

S → AbabA

A → aA | bA | ?

FNG:

|  |  |
| --- | --- |
| S → AbabA | babA | Abab | bab  A → aA | bA | a | b  S → Abab  S → babA  S → Abab  S → bab  A → aA  A→ bA  A → a  A → b  B → b  C → a    S → ABCB  S → BCBA  S → ABCB  S → BCB  D → BC | S → ADB  S → DBA  S → ADB  S → DB  E → DB  S → AE  S → EA  S → AE  S → AE | EA  A → CA | BA | a | b  B → b  C → a  D→ BC  E → DN |

*L2 = {w* ∈ {a, b, c*}\* | w começa com a e termina com c}*

*CFG:*

*S → aAc*

*A → aA | bA | cA | ?*

*FNG:*

|  |  |
| --- | --- |
| S → aAc | ac  A → aA | a | bA | b | cA | c  B → b  C → c  D → a  S → DAC | DC  A → DA | a | BA | b | CA | c  E → AC | S → DE | DC  A → DA | a | BA | b | CA | c  B → b  C → c  D → a  E → AC |

*L3 = {w ∈ {a, b, c}\* | w começa com a e tem no mínimo 2 ba}*

CFG:

S → aAbAbA

*A → aA | bA | cA | ?*

*FNG:*

|  |  |
| --- | --- |
| S → aAbAbA | abAbA | aAbbA | aAbAb | abb  A → aA | a | bA | b | cA | c  B → b  C → c  D → a  S → DABABA | DBABA | DABBA | DADAB | DBB  A → DA | a | BA | b | CA | c  E → DA  F → BA  G → DB  S → EFF | DFF | EBF | EEB | GB  H → FF  I → EB | S → EH | DH | IF | GB  A → DA | a | BA | b | CA | c  B → b  C → c  D → a  E → DA  F → BA  G → DB  H → FF  I → EB |

*L4 = {w ∈ {0, 1}\* | w possui a substring 1010}*

CFG:

S → A1010A

A → 0A | 1A | ?

FNG:

|  |  |
| --- | --- |
| S → A1010A | 1010A | 1010  A → 0A | 0 | 1A | 1  B → 0  C → 1  S → ACBCBA | CBCBA | CBCB  A → BA | 0 | CA | 1  D → CB  S → ADDA | DDA | DD  E → DA  F → AD | S → FE | DE | DD  A → BA | 0 | CA | 1  B → 0  C → 1  D → CB  E → DA  F → AD |