Exercises with n-gram grammars

Exercise 1.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{add, bdb, dad, dab\}$

1. cbdadb
2. aabb
3. ε
4. d

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 2.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baaa, aabb, baba, aaba, abbb, bbba\}$

1. baababaabb
2. b
3. abbaaaa
4. ε

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 3.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dcab, aadc, ddda, aadb\}$

1. add
2. b

3. d
4. ε

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 4.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes\ltimes, cc, dc, ab, bc, ca, ad, da, dd, c\ltimes\}$

1. ε
2. daa
3. dc
4. dbdaabcdc

Solution

1. No
2. Yes
3. No
4. No

Exercise 5.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cabd, badc, cddd, bacd, bcac, ccac\}$

1. cb
2. caa
3. daabd
4. a

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 6.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ab, ba, aa, b\ltimes\}$

1. b
2. a
3. abab
4. abbaab

Solution

1. No
2. No
3. No
4. No

Exercise 7.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, ab, bb, dc, ac, cd, ca, da, bd, d\ltimes\}$

1. ccddadc
2. cd
3. b
4. ε

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 8.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes b, \rtimes\rtimes ab, \rtimes\rtimes ba, \rtimes\rtimes aa, \rtimes\rtimes a\ltimes, \rtimes aba, \rtimes aaa, \rtimes ba\ltimes, \rtimes a\ltimes\ltimes, bbaa, abbb, bbba, aaab, aabb, abba, baab, aba\ltimes, baa\ltimes, ba\ltimes\ltimes, aa\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. b
2. ba
3. aba

4. a

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 9.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \ \rtimes \ \rtimes a, \rtimes \ \rtimes \ ab, \rtimes \ \rtimes \ aa, \rtimes \ \rtimes \ a\ltimes, \rtimes aba, \rtimes abb, \rtimes aa\ltimes, \rtimes a \ltimes \ltimes, bbab, abbb, bbba, babb, abab, baba, abb\ltimes, aba\ltimes, ba \ltimes \ltimes, aa \ltimes \ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. abbbbbbbbba
2. abbaba
3. a
4. bbbbbbbbba

Solution

1. No
2. Yes
3. No
4. No

Exercise 10.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, aa, ab, bc, ca, ad, dd, d\ltimes, a\ltimes\}$

1. ab
2. a
3. cadbddcb
4. daddbbd

Solution

1. Yes
2. No
3. No
4. No

Exercise 11.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes ed, \rtimes edb, bebb, bbeb, edbb, dbbe, ebb\ltimes, bb \ltimes \ltimes, b \ltimes \ltimes \ltimes\}$

1. dcabbd
2. aeecec
3. b
4. caab

Solution

1. No
2. No
3. No
4. No

Exercise 12.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cc, dad, cda, acd, cdd, dda, ada, ccd, dac, dab, ab\ltimes, b \ltimes \ltimes\}$

1. dccbcd
2. abccba
3. dadac
4. dbca

Solution

1. No
2. No
3. No
4. No

Exercise 13.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbb, bac, cba, baa\}$

1. abcba
2. ccbb
3. ε
4. cbabc

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 14.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \quad \rtimes \quad a, \rtimes \quad \rtimes \quad c, \rtimes \quad \rtimes \quad \ltimes, \rtimes cc, \rtimes ac, \rtimes a\ltimes, \rtimes \quad \ltimes \ltimes, ccc, acc, cbb, ccb, cac, cca, ac\ltimes, bb\ltimes, a \ltimes \ltimes, b \ltimes \ltimes, c \ltimes \ltimes\}$

1. aba
2. ε
3. ac
4. a

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 15.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dad, dbc, aca, dcc\}$

1. ccacddbad
2. d
3. ε
4. b

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 16.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cc, bc, bb, ab, cb, ba, ca, aa\}$

1. cba
2. ε
3. b
4. bbccbaaac

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 17.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bdc, daa, cba, cbd\}$

1. dbb
2. dadbad
3. cdaadc
4. abdd

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 18.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes bb, \rtimes \rtimes ab, \rtimes \rtimes \ltimes\ltimes, \rtimes aba, \rtimes bbb, \rtimes \ltimes \ltimes\ltimes, bbab, abaa, bbba, aaab, bbbb, baaa, baba, aab\ltimes, aba\ltimes, ba\ltimes\ltimes, ab\ltimes\ltimes, b\ltimes \ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. abbbaba
2. a
3. ε

4. baaba

Solution

1. No
2. Yes
3. No
4. No

Exercise 19.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ccbd, bcbd, bdda, baee, ebad, ccda\}$

1. ε
2. e
3. d
4. eaed

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 20.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bacb, aadd, cdcc, bacd, dcac, bcdc, bddd, acca\}$

1. bdccbc
2. d
3. aba
4. ε

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 21.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{babb, adbc, aadc, cacd, abdc, dcda\}$

1. ε
2. b
3. d
4. dbba

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 22.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes e, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes da, \rtimes bb, \rtimes e\ltimes, \rtimes \ltimes \ltimes, eba, dae, bac, cae, aca, aeb, ae\ltimes, bb\ltimes, b \ltimes \ltimes, e \ltimes \ltimes\}$

1. e
2. bbbca
3. dedbbae
4. ε

Solution

1. No
2. No
3. Yes
4. No

Exercise 23.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bcec, eaac, cbab, bcab, bacd, bbcc\}$

1. ε
2. bee
3. cb
4. eddca

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 24.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cc, ae, ee, ce, ac, cb, ed\}$

1. eb
2. eeb
3. ε
4. ebcaeedc

Solution

1. No
2. Yes
3. No
4. No

Exercise 25.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ad, \rtimes ca, \rtimes \ltimes \ltimes, acd, caa, cac, dca, cdc, ad\ltimes, aa\ltimes, a\ltimes \ltimes, d \ltimes \ltimes\}$

1. ad
2. bda
3. ε
4. ac

Solution

1. No
2. Yes
3. No
4. No

Exercise 26.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes da, \rtimes \rtimes dd, \rtimes \rtimes cc, \rtimes \rtimes d\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes ddc, \rtimes daa, \rtimes cc\ltimes, \rtimes d \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, aaad, aadb, daaa, ddc\ltimes, adb\ltimes, cc \ltimes \ltimes, dc \ltimes \ltimes, db \ltimes \ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. bbda
2. bddc
3. ac
4. ε

Solution

1. No
2. No
3. Yes
4. No

Exercise 27.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes\ltimes, \rtimes bd, \rtimes\ltimes\ltimes, cdb, bcc, acd, bdc, cad, cac, dbc, adb, dca, cca, db\ltimes, b\ltimes \ltimes\}$

1. ε
2. dca
3. dcadcdbda
4. aadd

Solution

1. No
2. No
3. No
4. No

Exercise 28.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbab, aabb, abaa, aaba, abbb, abab, abba, bbba\}$

1. a
2. ε

3. ababbab
4. baaab

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 29.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes bb, \rtimes a \ltimes, \rtimes \ltimes \ltimes, bbb, aab, aaa, abb, bba, baa, bb \ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. aaaababaabbb
2. bbaabbbabbaa
3. b
4. abab

Solution

1. No
2. No
3. No
4. No

Exercise 30.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes aa, aba, aaa, aab, baa, aa \ltimes, a \ltimes \ltimes\}$

1. babbabbbb
2. ab
3. abaab
4. aabbabbbb

Solution

1. No
2. No
3. No
4. No

Exercise 31.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baaa, bbaa, bbab, aabb, abaa, abab, baab, abba\}$

1. aab
2. bbb
3. b
4. bbaabbaa

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 32.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes b\ltimes, \rtimes \ltimes \ltimes, bab, aba, aaa, aab, baa, ab\ltimes, b \ltimes \ltimes\}$

1. aa
2. baa
3. ababbb
4. a

Solution

1. No
2. No
3. No
4. No

Exercise 33.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes bc, \rtimes \rtimes db, \rtimes \rtimes ca, \rtimes \rtimes d\ltimes, \rtimes cad, \rtimes bca, \rtimes db\ltimes, \rtimes d \ltimes \ltimes, dccb, cadc, adcc, ccbd, bca\ltimes, cbd\ltimes, bd \ltimes \ltimes, ca \ltimes \ltimes, db \ltimes \ltimes, b \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. bb
2. daddbc
3. cbccdaa

4. d

Solution

1. No
2. No
3. Yes
4. No

Exercise 34.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes c, \rtimes\ltimes, cc, bb, ac, cb, ba, a\ltimes, c\ltimes\}$

1. bcba
2. d
3. aaaabca
4. ε

Solution

1. No
2. No
3. Yes
4. No

Exercise 35.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ca, \rtimes \rtimes dc, \rtimes \rtimes \ltimes\ltimes, \rtimes cab, \rtimes dc\ltimes, \rtimes \ltimes \ltimes\ltimes, bcaa, abad, bbca, badb, aaab, abbc, cabb, caaa, aaba, adb\ltimes, dc \ltimes \ltimes, db \ltimes \ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. cdbdc
2. ε
3. abcdd
4. dc

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 36.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{be, dd, cb, ba\}$

1. e
2. ae
3. ε
4. d

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 37.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes \rtimes d, \rtimes ec, \rtimes d\ltimes, aac, ddc, caa, eca, aaa, acb, edd, bed, cbe, dc\ltimes, d \ltimes \ltimes, c \ltimes \ltimes\}$

1. abcddea
2. d
3. ε
4. ecaacbeddc

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 38.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{abea, bcea, cabd, dece, dcdb, cceb, edde\}$

1. acaccadc
2. cbd
3. b
4. abdc

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 39.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aba, abb, cab, baa, cba, bcb, cca\}$

1. a
2. cc
3. cb
4. ε

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 40.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes c, \rtimes\rtimes ca, \rtimes\rtimes ac, \rtimes acd, \rtimes ca\ltimes, dbcb, bcbd, cbdb, cdbc, acdb, bdb\ltimes, db\ltimes \ltimes, ca \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. ca
2. dbaadba
3. adab
4. ccdbc

Solution

1. No
2. No
3. No
4. No

Exercise 41.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bad, aee, dae, bdd, bee, abe\}$

1. a
2. e
3. ε
4. aaaccea

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 42.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aa, ab, bb, cb, ba, da, dd, bd\}$

1. dadc
2. d
3. ε
4. abaacc

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 43.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes c, dc, ac, ba, ca, ad, aa, a\ltimes, c\ltimes\}$

1. c
2. ca
3. ba
4. d

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 44.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes be, \rtimes \rtimes e\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes bec, \rtimes e \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, cdbd, bcdd, ecdb, becd, ebcd, debc, dbdd, bdde, ddeb, cdd\ltimes, dd \ltimes \ltimes, e \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. edbd
2. ε
3. eea
4. ac

Solution

1. Yes
2. No
3. No
4. No

Exercise 45.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{caa, bcc, cbb, abb\}$

1. bbaab
2. babaaa
3. aaccba
4. ε

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 46.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cdb, ccc, cda, bab, dba, cad, bac, cdc\}$

1. ε
2. d
3. ccbcdadcdd
4. abc

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 47.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aac, abc, acc, baa, cac\}$

1. bccbaaba
2. b
3. ε
4. c

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 48.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes d, \rtimes\rtimes\rtimes a, \rtimes\rtimes ab, \rtimes\rtimes dd, \rtimes ddc, \rtimes ab\ltimes, caad, aadc, dcaa, ddca, adc\ltimes, dc\ltimes \ltimes, ab \ltimes \ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bdcda
2. aad
3. dadd
4. ab

Solution

1. No
2. No
3. Yes
4. No

Exercise 49.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes ba, \rtimes \rtimes aa, \rtimes \rtimes b\ltimes, \rtimes baa, \rtimes aab, \rtimes b \ltimes \ltimes, babb, aaab, abab, abba, baaa, aaba, bba\ltimes, aab\ltimes, ba\ltimes\ltimes, ab\ltimes\ltimes, b\ltimes\ltimes\ltimes, a\ltimes \ltimes\ltimes\}$

1. b
2. baaab
3. aab
4. baaaabb

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 50.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes d, \rtimes\ltimes, db, cc, dc, dd, ac, cb, ba, ad, aa, b\ltimes, c\ltimes\}$

1. dabbdc
2. cdcbcbddabaa
3. ε
4. abcbcbd

Solution

1. No
2. Yes
3. No
4. No

Exercise 51.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbb, aba, aaa, aab\}$

1. b
2. ε
3. abab
4. a

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 52.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes b \ltimes, \rtimes \ltimes \ltimes, bcc, ccc, cbb, bbc, ccb, cc\ltimes, b \ltimes \ltimes, c \ltimes \ltimes\}$

1. b
2. bbcc
3. ε
4. aaccaca

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 53.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ab, bb, ba, b \ltimes\}$

1. ε
2. abaaaa
3. b
4. ab

Solution

1. No
2. Yes
3. No
4. No

Exercise 54.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbbb, bcba, abcb, caac, cbcc\}$

1. b
2. c
3. ε
4. bc

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 55.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbb, aba, aab, abb, bba, baa\}$

1. aaababababbb
2. bbbbaaa
3. a
4. bb

Solution

1. No
2. Yes
3. Yes
4. No

Exercise 56.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes ba, \rtimes bac, \rtimes ba\ltimes, baca, bccc, cccb, cacb, acbc, acac, cbcc, caca, ccb\ltimes, ba\ltimes \ltimes, cb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. acabcccac
2. babcbbababa
3. aac
4. ccbcbaacaaca

Solution

1. No
2. No
3. No
4. No

Exercise 57.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bb, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes bba, \rtimes aaa, \rtimes \ltimes \ltimes\ltimes, bbaa, abbb, bbba, aaab, aabb, bba\ltimes, baa\ltimes, ba \ltimes \ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. b
2. ε
3. aaabb
4. bbbbbb

Solution

1. Yes
2. No
3. No
4. No

Exercise 58.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bd, \rtimes \rtimes dc, \rtimes \rtimes \ltimes\ltimes, \rtimes dca, \rtimes bdd, \rtimes \ltimes \ltimes\ltimes, dded, deda, bdde, edac, dca\ltimes, dac\ltimes, ca \ltimes \ltimes, ac \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. b
2. e

3. ε
4. de

Solution

1. No
2. Yes
3. No
4. No

Exercise 59.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbb, bab, aba, aaa, abb, bba, baa\}$

1. aabaaa
2. ε
3. b
4. a

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 60.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes ad, dcc, dba, ccb, bad, bdc, dbd, adb, cb\ltimes, b \ltimes \ltimes\}$

1. bdcdabcdba
2. dacd
3. acaabbac
4. ε

Solution

1. No
2. No
3. No
4. No

Exercise 61.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{babb, bbbb, aaab, aabb, abbb, baab, bbba\}$

1. ε
2. b
3. ba
4. a

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 62.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, ab, bb, ac, cb, ba, a\ltimes, b\ltimes\}$

1. a
2. acbbab
3. bb
4. b

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 63.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aacc, bdad, cbda, adda, bddd, bbcb, abbb\}$

1. cdaddad
2. d
3. b
4. ε

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 64.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{babb, baaa, aaaa, aaba, abab, abba\}$

1. bbaaabaaaba
2. ε
3. abbabaababb
4. aaaabbaabba

Solution

1. Yes
2. No
3. No
4. No

Exercise 65.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aa, ce, bb, ad\}$

1. dbc
2. dedc
3. cebce
4. b

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 66.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aac, ccc, caa, baa, cca\}$

1. acbbbc
2. bcab
3. ε
4. a

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 67.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, abb, bbc, baa, bac, cba, bca, cca\}$

1. ε
2. cbbcc
3. abbbb
4. bb

Solution

1. No
2. No
3. Yes
4. No

Exercise 68.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes b, \rtimes\rtimes aa, \rtimes\rtimes ba, \rtimes baa, \rtimes aa\ltimes, babb, bbab, baba, aaba, abaa, abab, baab, abba, baa\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. aabbbaab
2. aab
3. bbbabbaab
4. abaabaa

Solution

1. No
2. No
3. No
4. No

Exercise 69.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{abde, abee, dcea, badc\}$

1. dce
2. e
3. acddbdedcc
4. ε

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 70.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aaac, accb, ccab, acaa, caca, cccc, aaca\}$

1. ε
2. b
3. bca
4. cb

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 71.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \quad \rtimes \quad \rtimes d, \rtimes \quad \rtimes \quad \rtimes a, \rtimes \quad \rtimes \quad \rtimes b, \rtimes \quad \rtimes \quad \rtimes \ltimes, \rtimes \quad \rtimes$ $ba, \rtimes \quad \rtimes \quad aa, \rtimes \quad \rtimes \quad db, \rtimes \quad \rtimes \quad \ltimes \ltimes, \rtimes aac, \rtimes bab, \rtimes db \ltimes, \rtimes \quad \ltimes$ $\ltimes \ltimes, cccb, bacc, abac, accc, ccbd, baba, aac \ltimes, cbd \ltimes, bd \quad \ltimes \quad \ltimes, db \quad \ltimes \quad \ltimes, ac \quad \ltimes$ $\ltimes, c \ltimes \ltimes \ltimes, b \ltimes \ltimes \ltimes, d \ltimes \ltimes \ltimes\}$

1. ε
2. db
3. daddcbaad
4. a

Solution

1. Yes
2. No
3. No
4. No

Exercise 72.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ec, db, ae, ab, dc, ce, eb\}$

1. be
2. e
3. cebedabdb
4. cecae

Solution

1. Yes
2. No
3. No
4. No

Exercise 73.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes da, \rtimes \rtimes a \ltimes, \rtimes \rtimes \ltimes \ltimes, \rtimes daa, \rtimes a \ltimes \ltimes, \rtimes \ltimes$ $\ltimes \ltimes, aaac, aace, ceda, daaa, aced, eda \ltimes, da \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. ε

2. bd
3. a
4. ecbdbc

Solution

1. No
2. Yes
3. No
4. No

Exercise 74.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{babb, bbbb, aaaa, abbb, abab, bbba\}$

1. abb
2. ababbaabb
3. b
4. ε

Solution

1. No
2. Yes
3. Yes
4. No

Exercise 75.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes bb, \rtimes \ltimes \ltimes, bbb, bcc, cab, bbc, cca, ab\ltimes, ba\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. ε
2. bca
3. bcba
4. bbaca

Solution

1. No
2. No
3. No
4. No

Exercise 76.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes aa, \rtimes \rtimes cb, \rtimes \rtimes \ltimes\ltimes, \rtimes cbb, \rtimes aac, \rtimes \ltimes \ltimes\ltimes, bbca, cbbb, bcac, bbbc, cac\ltimes, aac\ltimes, ac \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. b
2. abaacac
3. cab
4. acabcac

Solution

1. No
2. No
3. No
4. No

Exercise 77.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes d, \rtimes \ltimes, be, db, ae, bb, eb, ad, ea, d\ltimes, b\ltimes\}$

1. d
2. ε
3. ad
4. edbbe

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 78.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ccc, bdc, ccd, cba, cca\}$

1. cdb
2. bcaac
3. bbddda
4. ε

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 79.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes ba, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes baa, \rtimes aac, \rtimes \ltimes \ltimes\ltimes, acab, acaa, caac, aaca, cabc, abc\ltimes, baa\ltimes, aa \ltimes \ltimes, bc \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. ε
2. cbbabb
3. bc
4. cbca

Solution

1. No
2. No
3. No
4. No

Exercise 80.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{db, ac, cb, ba, da, bd\}$

1. d
2. bb
3. ε
4. b

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 81.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bada, acad, dcdb, bddd, bbad\}$

1. ε
2. adbbd
3. a
4. abb

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 82.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{be, ab, ce, ba, cd\}$

1. e
2. ε
3. cbbdea
4. d

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 83.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbb, aba, aab, abb, bba\}$

1. b
2. abbaaa
3. ε
4. bb

Solution

1. No
2. Yes
3. Yes
4. No

Exercise 84.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes ba, aac, caa, aaa, acb, aab, bac, baa, cba, aca, ab\ltimes, b \ltimes \ltimes\}$

1. cbacca
2. babab
3. baaab
4. baab

Solution

1. No
2. Yes
3. Yes
4. No

Exercise 85.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, be, db, ab, ac, ca, ad, da, ea, b\ltimes\}$

1. ac
2. aeabacd
3. beabbc
4. dedebcdcbc

Solution

1. No
2. No
3. No
4. No

Exercise 86.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cc, dc, bb, ab, cb, cd, da, aa\}$

1. adcddbccb
2. d
3. ε
4. dcbbbbdd

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 87.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ab, ba, aa, a\ltimes\}$

1. ε
2. abaabb
3. baa
4. ba

Solution

1. No
2. Yes
3. Yes
4. No

Exercise 88.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aab, baa, bcb, aca, cca\}$

1. cbca
2. ε
3. a
4. abccb

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 89.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aacc, cccb, bbca, caac, caab, babc\}$

1. bcb
2. acb
3. a
4. caabb

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 90.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aae, ccb, bad, edc, dac, eec, dab\}$

1. eadbedc
2. da
3. eedacdabac
4. ade

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 91.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes c, \rtimes\ltimes, ab, bb, bc, ac, ba, ca, aa, c\ltimes\}$

1. bbbbabacb
2. cb
3. bbaaabbc
4. ccbabba

Solution

1. No
2. No
3. No
4. No

Exercise 92.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ad, da, aa, d\ltimes\}$

1. ad
2. aad
3. ε
4. db

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 93.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{eea, acb, abb, bec, baa, cac, dbc, eaa\}$

1. ba
2. ccacad
3. ε
4. badcb

Solution

1. No
2. Yes
3. Yes
4. No

Exercise 94.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baaa, bbaa, bbab, baba, aaba, abab, bbba\}$

1. bbb
2. ε
3. aabbaaaaaaa
4. b

Solution

1. Yes
2. No
3. Yes
4. No

Exercise 95.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ab, \rtimes \ltimes \ltimes, bcc, abc, ccc, cbc, ccb, cba, bcb, ba\ltimes, a \ltimes \ltimes\}$

1. ac
2. ba
3. aaaccbbc
4. cbbabb

Solution

1. No
2. No
3. No
4. No

Exercise 96.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, \rtimes\ltimes, bc, dc, cb, ba, ad, a\ltimes, c\ltimes\}$

1. bddb
2. a
3. ε
4. abacdb

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 97.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{db, bc, ac, cb, cd, ad, dd\}$

1. d
2. bdd
3. ε
4. dcbbaca

Solution

1. No
2. Yes
3. No
4. No

Exercise 98.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bd, \rtimes ca, \rtimes \ltimes \ltimes, dcb, bdb, cdd, bcb, ddc, dbc, dcd, bdc, cbd, ca\ltimes, cb\ltimes, b \ltimes \ltimes, a \ltimes \ltimes\}$

1. ddbabaab
2. ε
3. ca
4. bbaabdad

Solution

1. Yes
2. Yes
3. No
4. No

Exercise 99.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bba, baa, aaa, bbb\}$

1. aababbaba
2. b
3. ε
4. babab

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 100.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes aa, \rtimes a\ltimes, \rtimes \ltimes \ltimes, bbb, aab, abb, bba, baa, aa\ltimes, ba\ltimes, a \ltimes \ltimes\}$

1. bab
2. a
3. ε
4. aa

Solution

1. Yes
2. Yes
3. Yes
4. No

Exercise 101.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ea, \rtimes \rtimes d\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes eaa, \rtimes d \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, beac, aaee, aeeb, eacb, eebe, aaae, eaaa, ebea, acb\ltimes, cb\ltimes\ltimes, b\ltimes\ltimes\ltimes, d\ltimes\ltimes\ltimes\}$

1. babd
2. cdadcebe
3. ceabccecb
4. adddaaabdd

Solution

Exercise 102.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes e\ltimes, \rtimes \ltimes \ltimes, cca, bac, baa, aad, cab, aaa, acc, aba, ad\ltimes, e \ltimes \ltimes, d \ltimes \ltimes\}$

1. ccad
2. bcdebab
3. cdbb
4. ddabad

Solution

Exercise 103.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ca, \rtimes \rtimes cc, \rtimes \rtimes \ltimes\ltimes, \rtimes ccc, \rtimes ca\ltimes, \rtimes \ltimes \ltimes\ltimes, cccb, cccc, cbba, ccbb, bba\ltimes, ca \ltimes \ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. cbcccc
2. bcacc
3. cc
4. abccc

Solution

Exercise 104.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, ac, ba, aa, ca, bb, ab, a\ltimes\}$

1. a
2. bccba
3. ccc
4. acc

Solution

1. ε

Exercise 105.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ba, cc, aa, ca, ab, a \ltimes\}$

1. ccc
2. bccaa
3. abcabcb
4. c

Solution

Exercise 106.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ad, \rtimes \ltimes \ltimes, ebb, aea, dea, ade, eae, aeb, bb \ltimes, b \ltimes \ltimes\}$

1. ε
2. ddbca
3. ccecabda
4. ddbcdbea

Solution

1. ε

Exercise 107.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aab, bab, aaa, abb, aba\}$

1. abbbba
2. aaaaaaabb
3. bbbabbaa
4. abb

Solution

Exercise 108.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aaa, aab, bab, bbb, baa, bba, abb, aba\}$

1. aabbb
2. bba
3. bab
4. bbb

Solution

Exercise 109.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes ab, \rtimes \ltimes \ltimes, acb, cba, bac, bab, abc, bcb, aba, ba\ltimes, a \ltimes \ltimes\}$

1. cb
2. cc
3. abbcb
4. bb

Solution

Exercise 110.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes\ltimes, \rtimes bd, \rtimes bc, \rtimes\ltimes\ltimes, bbd, abb, dab, bdc, bbb, dcd, dda, bdd, cd\ltimes, bc\ltimes, c\ltimes \ltimes, d \ltimes \ltimes\}$

1. acbbcba
2. cb
3. cddaadaa
4. cddacdddac

Solution

Exercise 111.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{baa, bab, bba, abb, aba\}$

1. aaaab
2. abb
3. abba
4. babab

Solution

1. ε

Exercise 112.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes ac, \rtimes \rtimes ba, \rtimes \rtimes c\ltimes, \rtimes bac, \rtimes acc, \rtimes ba\ltimes, \rtimes c \ltimes \ltimes, bacc, accc, cccc, ccc\ltimes, acc\ltimes, cc \ltimes \ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. ba
2. ccccba
3. ε
4. aca

Solution

1. ε

Exercise 113.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes b, \rtimes\ltimes, cc, aa, ca, bc, ab, c\ltimes\}$

1. abbc
2. aabb
3. baccac
4. bcbbcbc

Solution

Exercise 114.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bd, \rtimes \rtimes \ltimes\ltimes, \rtimes bdd, \rtimes \ltimes$

$\ltimes\ltimes, ddbd, dbcb, cbcc, bcbc, dbdb, bdbc, bddb, bcc\ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. ε
2. bcdcdddcab
3. adcacac
4. ccaacaac

Solution

1. ε

Exercise 115.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes ea, \rtimes \rtimes ab, \rtimes \rtimes ce, \rtimes \rtimes b\ltimes, \rtimes ceb, \rtimes abb, \rtimes ea\ltimes, \rtimes b \ltimes \ltimes, abbe, eada, bbea, adab, bead, dabd, abde, bde\ltimes, ceb\ltimes, de \ltimes \ltimes, eb \ltimes \ltimes, ea \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes, e \ltimes \ltimes\ltimes\}$

1. bbbcc
2. bcbbda
3. dee
4. a

Solution

Exercise 116.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, eb, be, ea, ab, a\ltimes\}$

1. caedee
2. abaec
3. d
4. ccccdd

Solution

Exercise 117.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ac, ba, aa, cb, ca, bc, ab\}$

1. ε

2. bbcacaacbc
3. abbcccb
4. acaccbb

Solution

1. ε

Exercise 118.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes ab, \rtimes \ltimes \ltimes, aab, bab, baa, aba, ab\ltimes, ba\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. aaaabbb
2. a
3. bbba
4. aaba

Solution

Exercise 119.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes e, \rtimes\rtimes\rtimes d, \rtimes\rtimes dc, \rtimes\rtimes ed, \rtimes edc, \rtimes dcd, eeec, edce, dcee, ceee, dcd\ltimes, eec\ltimes, cd\ltimes \ltimes, ec \ltimes \ltimes, d \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. acba
2. adbaaca
3. dcecdeb
4. ddddd

Solution

Exercise 120.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes aa, \rtimes a\ltimes, aab, abb, baa, aaa, bba, aba, aa\ltimes, a \ltimes \ltimes\}$

1. aba
2. aabaaaabb
3. aaba
4. ε

Solution

Exercise 121.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\ltimes, ac, ba, cc, cb, c\ltimes\}$

1. ba
2. cbcbb
3. b
4. bcaaa

Solution

Exercise 122.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \quad \rtimes \quad \rtimes b, \rtimes \quad \rtimes \quad \rtimes\ltimes, \rtimes \quad \rtimes \quad bc, \rtimes \quad \rtimes \quad \ltimes\ltimes, \rtimes bcc, \rtimes \quad \ltimes \quad \ltimes\ltimes, ccaa, caaa, bcca, aaa\ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. ccaba
2. ac
3. aa
4. cbbaaa

Solution

Exercise 123.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ac, be, aa, ec, ca, c\ltimes, b\ltimes\}$

1. d
2. ccbaa
3. a
4. dbaeed

Solution

Exercise 124.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{ca, cc, ba, ab\}$

1. bbbca
2. bbaccbcb
3. bacb
4. cabaca

Solution

Exercise 125.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes\rtimes, cd, de, db, bc, ed, e\ltimes\}$

1. cbde
2. aaaae
3. d
4. cda

Solution

Exercise 126.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ca, \rtimes \ltimes \ltimes, adc, aab, bea, cbe, eaa, dcb, cad, ab\ltimes, b \ltimes \ltimes\}$

1. ceae
2. aae
3. abca
4. dcdedcbda

Solution

Exercise 127.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes c, \rtimes\rtimes, ac, ba, cc, cb, ca, bc, c\ltimes, a\ltimes\}$

1. baaccb
2. bbccacca
3. bacbabcba
4. cababc

Solution

Exercise 128.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\ \rtimes\ \rtimes e, \rtimes\ \rtimes\ \rtimes c, \rtimes\ \rtimes\ \rtimes\ltimes, \rtimes\ \rtimes\ cc, \rtimes\ \rtimes\ ed, \rtimes\ \rtimes\ ce, \rtimes\ \rtimes\ \ltimes\ltimes, \rtimes cca, \rtimes eda, \rtimes ce\ltimes, \rtimes\ltimes\ltimes\ltimes, abcb, cbdd, bcbd, edab, dabc, bdd\ltimes, cca\ltimes, ca\ltimes\ltimes, dd\ltimes\ltimes, ce\ltimes\ltimes, a\ltimes\ltimes\ltimes, d\ltimes\ltimes\ltimes, e\ltimes\ltimes\ltimes\}$

1. ε
2. ed
3. aedc
4. baddc

Solution

1. ε

Exercise 129.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes aa, \rtimes\rtimes bb, \rtimes\rtimes b\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes aaa, \rtimes bba, \rtimes b\ltimes\ltimes, \rtimes\ltimes\ltimes\ltimes, bbaa, babb, bbba, abbb, baab, aabb, bbab, abba, aaa\ltimes, bba\ltimes, aa\ltimes\ltimes, ba\ltimes\ltimes, b\ltimes\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. ε
2. abbba
3. baabbbaa
4. baabaa

Solution

1. ε

Exercise 130.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aab, baa, bab, bbb, aaa, bba, abb\}$

1. ε
2. bbbab
3. bbabba
4. bbabbb

Solution

1. ε

Exercise 131.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \quad \rtimes \quad \rtimes e, \rtimes \quad \rtimes \quad \rtimes b, \rtimes \quad \rtimes \quad \rtimes a, \rtimes \quad \rtimes \quad ac, \rtimes \quad \rtimes$ $ae, \rtimes \quad \rtimes \quad eb, \rtimes \quad \rtimes \quad b\ltimes, \rtimes acc, \rtimes aed, \rtimes eb\ltimes, \rtimes b \quad \ltimes$ $\ltimes, aeda, bade, edaa, aaba, daab, deae, adea, abad, eae\ltimes, acc\ltimes, eb \quad \ltimes \quad \ltimes, cc \quad \ltimes$ $\ltimes, ae \ltimes \ltimes, b \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes, e \ltimes \ltimes\ltimes\}$

1. bdeeacdacd
2. dbaccccbba
3. baddadb
4. ca

Solution

Exercise 132.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes b, \rtimes\rtimes ac, \rtimes\rtimes bc, \rtimes bcb, \rtimes aca, bcbb, cbbc, ccba, bbcc, bccb, cba\ltimes, aca\ltimes, ca\ltimes$ $\ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. aca
2. bb
3. caaaaaab
4. caaacbca

Solution

1. ε

Exercise 133.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ab, ba, bb, aa\}$

1. baabbaaa
2. aabaaabaaab
3. ba
4. bbabb

Solution

Exercise 134.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\!\ltimes, eb, ce, ba, ae, cc, ec, ca, ad, d\ltimes\}$

1. cceddecd
2. ebdbadd
3. ddbbaa
4. cdba

Solution

Exercise 135.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes \ltimes \ltimes, add, ddb, dbb, bbd, aad, ddd, bdd, dd\ltimes, d \ltimes \ltimes\}$

1. dcabacaaa
2. dcdda
3. acca
4. daaaaca

Solution

Exercise 136.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes c, \rtimes cc, \rtimes d\ltimes, cca, ada, dab, cad, ab\ltimes, b \ltimes \ltimes, d \ltimes \ltimes\}$

1. d
2. bdc
3. ε
4. cacba

Solution

1. ε

Exercise 137.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\!\ltimes, ba, aa, ab, b\ltimes, a\ltimes\}$

1. ε

2. aaaababb
3. bbbbbbba
4. bbbabba

Solution

1. ε

Exercise 138.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes a, \rtimes \rtimes ac, \rtimes \rtimes da, \rtimes \rtimes ad, \rtimes adc, \rtimes daa, \rtimes ac\ltimes, acda, aacd, cdad, daac, adc\ltimes, dad\ltimes, dc \ltimes \ltimes, ac \ltimes \ltimes, ad \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. bbb
2. a
3. ddc
4. ε

Solution

Exercise 139.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes b, \rtimes \rtimes db, \rtimes \rtimes ad, \rtimes \rtimes b\ltimes, \rtimes ada, \rtimes db\ltimes, \rtimes b \ltimes \ltimes, adaa, aaee, daae, aee\ltimes, db \ltimes \ltimes, ee \ltimes \ltimes, b \ltimes \ltimes\ltimes, e \ltimes \ltimes\ltimes\}$

1. cbd
2. aadaad
3. badde
4. ε

Solution

Exercise 140.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ab, ac, ce, ee, eb, be, ca, bc, ea, c\ltimes\}$

1. ε
2. eeadabcaadb
3. aae

4. bcabecb

Solution

1. ε

Exercise 141.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ab, \rtimes a \ltimes, \rtimes \ltimes \ltimes, aab, abb, baa, aaa, bba, aba, aa \ltimes, a \ltimes \ltimes\}$

1. abbbbbababa
2. bbaabaab
3. aaa
4. baaab

Solution

Exercise 142.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes \ltimes, da, ac, bd, ca, ad, ab, a \ltimes\}$

1. daacccaaadd
2. ccacdaaccca
3. ddcdbdd
4. baccc

Solution

Exercise 143.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes cd, \rtimes a \ltimes, \rtimes \ltimes \ltimes, cdb, abd, bab, dba, bd \ltimes, a \ltimes \ltimes, d \ltimes \ltimes\}$

1. cddbcb
2. ddae
3. aaadbc
4. bacbb

Solution

Exercise 144.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes a, \rtimes\rtimes c, \rtimes\rtimes\ltimes, \rtimes cb, \rtimes aa, \rtimes a\ltimes, \rtimes\ltimes\ltimes, bbc, cac, cbb, bca, ac\ltimes, aa\ltimes, c\ltimes\ltimes, a\ltimes\ltimes\}$

1. ε
2. baaccb
3. c
4. bacb

Solution

1. ε

Exercise 145.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ac, ca, bc, ab, c\ltimes, a\ltimes\}$

1. c
2. caa
3. a
4. cca

Solution

1. ε

Exercise 146.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes c, \rtimes ca, \rtimes cd, cbc, acb, bad, dac, bcb, cda, cbb, bba, ca\ltimes, ad\ltimes, a\ltimes\ltimes, d\ltimes\ltimes\}$

1. adadcbbcdd
2. a
3. acaddccca
4. acbcaaabcb

Solution

Exercise 147.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes b, ac, ba, ca, ab, c\ltimes, a\ltimes\}$

1. ccccbbbc
2. abbabaaa
3. bccbccca
4. abacc

Solution

Exercise 148.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes ba, \rtimes bad, bada, abea, adab, dabe, beaa, eaa\ltimes, aa\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. acbbeae
2. ε
3. db
4. eebdbcdd

Solution

Exercise 149.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ac, ba, cc, aa, ca, bb, ab\}$

1. ε
2. babbcac
3. acaabacbccb
4. ccacbaaabbb

Solution

1. ε

Exercise 150.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{da, cd, ad, ed\}$

1. d

2. abeedeea
3. dbbbebda
4. bedebeaacc

Solution

1. ε

Exercise 151.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes \ltimes \ltimes, aaa, aab, baa, bbb, abb, bb\ltimes, b \ltimes \ltimes\}$

1. ε
2. aa
3. aaabba
4. ababb

Solution

1. ε

Exercise 152.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ac, \rtimes \rtimes \ltimes\ltimes, \rtimes acc, \rtimes \ltimes \ltimes\ltimes, dbcd, ccbd, bdbc, cbdb, accb, bcda, cdac, dac\ltimes, ac \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. ε
2. a
3. dccd
4. aadd

Solution

1. ε

Exercise 153.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, ac, cc, c\ltimes\}$

1. cbcbbb
2. bcaaba

3. acacac
4. cbabaa

Solution

Exercise 154.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ca, \rtimes \rtimes cc, \rtimes \rtimes ba, \rtimes \rtimes a\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes caa, \rtimes baa, \rtimes cc\ltimes, \rtimes a \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, aabc, abcb, caab, baab, cbbd, abca, bcbb, bcaa, caa\ltimes, bbd\ltimes, aa \ltimes \ltimes, cc \ltimes \ltimes, bd \ltimes \ltimes, a \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. dddbabddcc
2. cbccc
3. ccbccaaabd
4. accaaa

Solution

Exercise 155.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes e, \rtimes \rtimes \ltimes, \rtimes ec, \rtimes ee, \rtimes d\ltimes, \rtimes \ltimes \ltimes, ced, eca, ece, ded, ede, dec, ee\ltimes, ca\ltimes, a \ltimes \ltimes, e \ltimes \ltimes, d \ltimes \ltimes\}$

1. dddae
2. cdaedddcc
3. ebacbdb
4. edcacbbe

Solution

Exercise 156.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes ee, aea, eea, eae, ea\ltimes, a \ltimes \ltimes\}$

1. badea
2. acab
3. d
4. aeecac

Solution

Exercise 157.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \quad \rtimes \quad \rtimes c, \rtimes \quad \rtimes \quad \rtimes\ltimes, \rtimes \quad \rtimes \quad ca, \rtimes \quad \rtimes \quad \ltimes\ltimes, \rtimes cac, \rtimes \quad \ltimes \quad \ltimes\ltimes, acdb, dbcc, cbca, cacd, bcad, ccbc, bccb, cdbc, cad\ltimes, ad \ltimes \ltimes, d \ltimes \ltimes\ltimes\}$

1. ε
2. dbdca
3. ddbbbddccd
4. cdcbcbccc

Solution

1. ε

Exercise 158.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ac, ba, aa, cb, bc, bb, b\ltimes\}$

1. cababb
2. cccacc
3. ε
4. c

Solution

Exercise 159.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ccb, acb, cca, cac, cab, bba, abb\}$

1. ε
2. acbacbcc
3. abbc
4. bcacbc

Solution

1. ε

Exercise 160.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes a, \rtimes b, da, cd, ac, dd, ba, ca, bc, ab, b\ltimes, a\ltimes\}$

1. dddccba
2. daacdbabbb
3. cbddbb
4. dca

Solution

Exercise 161.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ccc, cba, bcc, bac, cbb, aaa, acc\}$

1. bba
2. cbbacaaacac
3. abac
4. baaabacbbab

Solution

1. ε

Exercise 162.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes ab, \rtimes a\ltimes, \rtimes \ltimes \ltimes, cbc, acb, aac, baa, bcb, ab\ltimes, cb\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. ε
2. caa
3. cbcb
4. cbcaa

Solution

1. ε

Exercise 163.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ba, aa, bb, ab, b\ltimes\}$

1. aba
2. babaaaba
3. aa
4. ε

Solution

Exercise 164.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\!\ltimes, ba, aa, cb, bc, bb, ab, b\ltimes\}$

1. ε
2. bbabbcbcaca
3. abcbcaacac
4. cbb

Solution

1. ε

Exercise 165.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes a, \rtimes \rtimes aa, \rtimes \rtimes ee, \rtimes \rtimes bb, \rtimes eec, \rtimes aaa, \rtimes bb\ltimes, baac, aabe, abeb, aaab, beba, aaaa, ebaa, aac\ltimes, eec\ltimes, ac\ltimes\ltimes, ec \ltimes \ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. cbde
2. cdaaccacb
3. ccecdecaea
4. ε

Solution

Exercise 166.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ac, \rtimes acc, baad, cbaa, ccba, accb, aad\ltimes, ad \ltimes \ltimes, d \ltimes \ltimes\ltimes\}$

1. abd
2. dcacc
3. cc

4. bca

Solution

Exercise 167.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes aa, \rtimes \rtimes ba, \rtimes \rtimes a \ltimes, \rtimes \rtimes \ltimes \ltimes, \rtimes aab, \rtimes baa, \rtimes aa \ltimes, \rtimes a \ltimes \ltimes, \rtimes \ltimes \ltimes \ltimes, babb, aaba, abab, abba, bba \ltimes, baa \ltimes, aa \ltimes \ltimes, ba \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. ε
2. bb
3. b
4. abab

Solution

1. ε

Exercise 168.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ab, \rtimes abb, \rtimes abc, bcaa, abca, bbbc, ccab, cabc, abbb, bcca, bbcc, caa \ltimes, abc \ltimes, aa \ltimes \ltimes, bc \ltimes \ltimes, a \ltimes \ltimes \ltimes, c \ltimes \ltimes \ltimes\}$

1. aac
2. aacbab
3. abcbccbcbab
4. abb

Solution

Exercise 169.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes ed, \rtimes eda, \rtimes edc, beed, edce, dceb, ebbe, cebb, bbee, eda \ltimes, eed \ltimes, da \ltimes \ltimes, ed \ltimes \ltimes, d \ltimes \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. eda
2. dab
3. cc
4. aeeab

Solution

1. ε

Exercise 170.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes ac, \rtimes bb, ccc, cac, acc, aca, bb\ltimes, cc\ltimes, b \ltimes \ltimes, c \ltimes \ltimes\}$

1. ε
2. bccbcc
3. cccbaa
4. aab

Solution

Exercise 171.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes aa, \rtimes b\ltimes, \rtimes \ltimes \ltimes, aaa, baa, bbb, bba, aa\ltimes, b \ltimes \ltimes, a \ltimes \ltimes\}$

1. ε
2. baa
3. babbbb
4. bbaab

Solution

1. ε

Exercise 172.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, cc, cb, bc, ab, c\ltimes, a\ltimes\}$

1. babb
2. cccb
3. acbccb
4. ca

Solution

Exercise 173.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bb, \rtimes \rtimes b\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes bbb, \rtimes bb\ltimes, \rtimes b \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, bbaa, babb, baaa, bbba, aaab, aabb, bbab, abba, abb\ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. ε
2. baaaaa
3. a
4. ba

Solution

1. ε

Exercise 174.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes aa, \rtimes \rtimes ca, \rtimes \rtimes cb, \rtimes \rtimes \ltimes\ltimes, \rtimes caa, \rtimes cbc, \rtimes aa\ltimes, \rtimes \ltimes \ltimes\ltimes, cbca, abbb, bbbb, cabb, bcab, caa\ltimes, bbb\ltimes, aa \ltimes \ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. bbbbaabc
2. bcac
3. acb
4. ba

Solution

Exercise 175.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes b, \rtimes\ltimes, bd, cc, cb, bc, db, c\ltimes, d\ltimes\}$

1. bdadab
2. bcd
3. cbdd
4. cbcacb

Solution

Exercise 176.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ba, aa, bb, ab, b\ltimes, a\ltimes\}$

1. aaab
2. baababbbb
3. b
4. ba

Solution

1. ε

Exercise 177.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ab, eb, ce, bd, dd, ba, ec, ea\}$

1. ε
2. dba
3. cdeaae
4. baecca

Solution

1. ε

Exercise 178.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes ca, \rtimes cb, \rtimes a\ltimes, bac, cab, cbb, bba, abc, bcb, cb\ltimes, ac\ltimes, b \ltimes \ltimes, c \ltimes \ltimes, a \ltimes \ltimes\}$

1. bccccbb
2. caaacc
3. abacc
4. bbabb

Solution

Exercise 179.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cd, ddb, dbc, cdd, cac, cae, eec, aee, bca, aca, ec\ltimes, c \ltimes \ltimes\}$

1. ε
2. cbaebaaa
3. c
4. db

Solution

Exercise 180.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes a\ltimes, \rtimes \ltimes \ltimes, aaa, baa, bbb, bba, bb\ltimes, aa\ltimes, b \ltimes \ltimes, a \ltimes \ltimes\}$

1. ε
2. bbaaba
3. abb
4. aaaaba

Solution

1. ε

Exercise 181.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aab, bab, baa, bbb, bba, aba\}$

1. ε
2. babaab
3. bbbaaa
4. ababab

Solution

1. ε

Exercise 182.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes aaa, \rtimes \ltimes \ltimes\ltimes, babb, abab, aabb, abba, aaab, bbaa, baab, aaba, bba\ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. ε
2. aaabbbbbba

3. aa
4. bbbabb

Solution

1. ε

Exercise 183.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, ac, ae, cc, aa, ca, ea, a\ltimes\}$

1. eadabad
2. b
3. ε
4. bccabdb

Solution

Exercise 184.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, da, cd, ac, dd, ce, ee, ca, dc, ad, ed, d\ltimes\}$

1. edeeabdeabc
2. ecbadad
3. ce
4. bdaaddcba

Solution

Exercise 185.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes c, cd, dd, bd, ba, cb, ca, dc, ab, b\ltimes\}$

1. b
2. cdbaaaccd
3. abd
4. ba

Solution

1. ε

Exercise 186.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes cb, \rtimes\rtimes cc, \rtimes ccc, \rtimes cbd, cbdc, dcab, bdca, ccc\ltimes, cab\ltimes, cc\ltimes\ltimes, ab\ltimes\ltimes, c\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. ccc
2. ddddbc
3. b
4. bbacd

Solution

1. ε

Exercise 187.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes bb, \rtimes b\ltimes, bbc, bad, cab, bca, adc, dcc, aba, cc\ltimes, b\ltimes\ltimes, c\ltimes\ltimes\}$

1. b
2. eeddadec
3. badaaeecb
4. adbacd

Solution

1. ε

Exercise 188.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes d, \rtimes dd, \rtimes d\ltimes, aab, abb, dda, daa, bb\ltimes, d\ltimes\ltimes, b\ltimes\ltimes\}$

1. bdccb
2. dacabb
3. cbda
4. ddaacb

Solution

Exercise 189.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes d, \rtimes\rtimes cb, \rtimes\rtimes db, \rtimes dbb, \rtimes cb\ltimes, cbbb, ccbb, bbbc, dbbc, bbcc, bccb, bbc\ltimes, bc\ltimes \ltimes, cb \ltimes \ltimes, b \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. abbbbd
2. cdbd
3. abdbcccbd
4. bdabbacd

Solution

Exercise 190.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes c, \rtimes\ltimes, dd, bd, ca, ad, db, d\ltimes\}$

1. bdcd
2. addccb
3. b
4. a

Solution

Exercise 191.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ab, \rtimes aba, babb, abab, bbab, abba, abbb, bbb\ltimes, aba\ltimes, ba \ltimes \ltimes, bb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abb
2. babbbab
3. aa
4. bbaaaabb

Solution

Exercise 192.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ba, cc, cb, bc, bb, ab, b\ltimes\}$

1. cb
2. cabab
3. bc

4. cacba

Solution

1. ε

Exercise 193.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bc, cca, cac, aac, bca, caa, cab, abc, acc, aca, bc\ltimes, c \ltimes \ltimes\}$

1. abcbbab
2. ababbabaca
3. a
4. acbabbc

Solution

Exercise 194.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, ba, aa, bb, ab, b\ltimes, a\ltimes\}$

1. babbabaabba
2. babaabaa
3. ε
4. baaa

Solution

Exercise 195.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ab, \rtimes abc, bbac, baca, cbbb, bcbb, bbba, abcb, aca\ltimes, ca\ltimes \ltimes, a\ltimes \ltimes \ltimes\}$

1. baa
2. bacacbbca
3. baacbbabb
4. bcc

Solution

Exercise 196.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bc, \rtimes ba, \rtimes b\ltimes, ccb, cba, bcc, bab, abb, bb\ltimes, ba\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. b
2. ccaaaca
3. c
4. ab

Solution

1. ε

Exercise 197.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes aa, \rtimes \ltimes \ltimes, aab, abb, baa, bab, aaa, bba, bb\ltimes, aa\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. baabba
2. b
3. aabbaba
4. bba

Solution

Exercise 198.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\ltimes, ca, bc, bb, ab, c\ltimes\}$

1. b
2. ccaacb
3. cb
4. acbacc

Solution

Exercise 199.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cc, \rtimes c\ltimes, ccc, cca, aab, baa, cab, bbb, abb, aba, bb\ltimes, c \ltimes \ltimes, b \ltimes \ltimes\}$

1. ε
2. ac
3. bbabcaabb
4. accbccacab

Solution

Exercise 200.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes dd, \rtimes b\ltimes, \rtimes \ltimes \ltimes, dad, bbd, abb, dab, bda, dda, ad\ltimes, b \ltimes \ltimes, d \ltimes \ltimes\}$

1. ε
2. c
3. d
4. daadda

Solution

1. ε

Exercises with n-gram grammars

Exercise 201.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baa, bbb, abb, bba, bab, aab, aaa\}$

1. aaba
2. a
3. abbabb
4. ε

Solution
[1, 3]

Exercise 202.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dae, ccc, cad, cca, bde, eeb, bcd\}$

1. baecba
2. abdeacdaa

3. d
4. eac

Solution
[0, 2, 3]

Exercise 203.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes c, \rtimes cb, \rtimes cc, \rtimes b\ltimes, bbb, bbd, bdc, cbb, dc\ltimes, cc\ltimes, c \ltimes \ltimes, b \ltimes \ltimes\}$

1. dacbc
2. dadcc
3. b
4. ab

Solution
[2]

Exercise 204.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cb, cc, bc, aa\}$

1. b
2. cc
3. bacaaa
4. acaacc

Solution
[0]

Exercise 205.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes c, cb, ac, ca, bc, cd, db, dd, aa, b\ltimes\}$

1. cb
2. dcccdcda
3. bcb
4. b

Solution

[0, 2, 3]

Exercise 206.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cc, bb, ba, bc, ab, ee\}$

1. ε
2. e
3. b
4. ea

Solution
[0, 1, 2, 3]

Exercise 207.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dbe, baa, dad, adb, cbd, aab, dea\}$

1. ce
2. b
3. ε
4. ad

Solution
[0, 1, 2, 3]

Exercise 208.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\bowtie \bowtie b, \bowtie \bowtie c, \bowtie \bowtie \ltimes, \bowtie bb, \bowtie c\ltimes, \bowtie \ltimes \ltimes, bca, acb, bcb, bbb, cbc, cac, bbc, cb\ltimes, c \ltimes \ltimes, b \ltimes \ltimes\}$

1. acabcac
2. bbb
3. b
4. bababcb

Solution
[]

Exercise 209.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cbbc, bbcc, ccbd, ecae, abcd, acda, ccec\}$

1. daba
2. deccd
3. ε
4. ddeaed

Solution
[0, 1, 2, 3]

Exercise 210.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baba, babb, bbba, aaab, bbbb, abba, bbab, abbb\}$

1. b
2. aaba
3. ε
4. a

Solution
[0, 1, 2, 3]

Exercise 211.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dcae, edee, cddc, bdcd, bcda, bedc\}$

1. cdeebdddcc
2. dcbcedba
3. ε
4. ccbce

Solution
[0, 1, 2, 3]

Exercise 212.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes \rtimes a, \rtimes ab, \rtimes a\ltimes, baa, bbb, abb, bab, aab, aba, bb\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. baabaaa
2. abb
3. a
4. bbab

Solution
[1, 2]

Exercise 213.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bdb, bca, dae, ebd, acc, adb, ecc, ede\}$

1. ε
2. b
3. deba
4. a

Solution
[0, 1, 2, 3]

Exercise 214.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes cb, \rtimes \rtimes ac, \rtimes \rtimes \ltimes\ltimes, \rtimes cbc, \rtimes ac\ltimes, \rtimes \ltimes \ltimes\ltimes, caab, bcaa, cbcb, cbbc, bbca, bcbb, aab\ltimes, ab \ltimes \ltimes, ac \ltimes \ltimes, b \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. ε
2. c
3. bbcbab
4. a

Solution
[0]

Exercise 215.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes aa, \rtimes \rtimes b\ltimes, \rtimes aab, \rtimes b \ltimes \ltimes, aabb, bbba, abbb, bba\ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. baba
2. b
3. ε
4. bbaa

Solution
[1]

Exercise 216.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes e, \rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes bc, \rtimes\rtimes ea, \rtimes\rtimes e\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes ead, \rtimes bcb, \rtimes e\ltimes\ltimes, \rtimes\ltimes\ltimes\ltimes, eaae, aaee, beaa, bcbe, cbea, aeec, ead\ltimes, eec\ltimes, ec\ltimes\ltimes, ad\ltimes\ltimes, e\ltimes\ltimes\ltimes, d\ltimes\ltimes\ltimes, c\ltimes\ltimes\ltimes\}$

1. ε
2. dcacbdc
3. adeadaab
4. eaceebeda

Solution
[0]

Exercise 217.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cadb, eabc, bbed, dbaa, eaaa\}$

1. b
2. a
3. cb
4. ε

Solution
[0, 1, 2, 3]

Exercise 218.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baa, bbb, abb, bba, bab, aab, aba, aaa\}$

1. ε
2. b

3. a
4. aab

Solution
[0, 1, 2]

Exercise 219.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes c, \rtimes\ltimes, bb, cb, bc, be, e\ltimes, d\ltimes\}$

1. e
2. dbdcedb
3. ε
4. acd

Solution
[2]

Exercise 220.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aabb, baba, bbba, aaab, abba, abaa, abab, baab\}$

1. bbbaba
2. ε
3. bbbbbabb
4. b

Solution
[1, 3]

Exercise 221.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, cba, bba, cab, cca, bbc\}$

1. b
2. cbaca
3. a
4. ε

Solution

[0, 2, 3]

Exercise 222.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ba, dd, dc, bd, cd, db, ab, c\ltimes, d\ltimes\}$

1. c
2. a
3. ε
4. cbc

Solution
[]

Exercise 223.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes e, \rtimes\rtimes\rtimes b, \rtimes\rtimes bc, \rtimes\rtimes ed, \rtimes bcb, \rtimes ede, \rtimes ed\ltimes, debb, ebbd, acbe, cbee, dacb, bbda, bdac, edeb, beeb$
$\ltimes, eb \ltimes \ltimes, cb \ltimes \ltimes, b \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. ed
2. bebaeebcdb
3. bcb
4. edcceeb

Solution
[0, 2]

Exercise 224.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, cc, bb, cb, ac, ca, bc, aa, c\ltimes\}$

1. bbbaccacbb
2. ccaacbc
3. abbabbcc
4. bbccabcbbac

Solution
[1]

Exercise 225.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baa, cdc, cac, cbb, bcd, dbd, dda\}$

1. aaacd
2. ba
3. dcdabcac
4. ε

Solution
[0, 1, 3]

Exercise 226.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, bb, cb, ca, ab, aa\}$

1. ε
2. b
3. bbaaabc
4. c

Solution
[0, 1, 3]

Exercise 227.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ab, \rtimes \ltimes \ltimes, baa, bab, aab, aba, ab\ltimes, b \ltimes \ltimes\}$

1. aaaababbb
2. aabbbbbba
3. abbbbaaab
4. ε

Solution
[3]

Exercise 228.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ca, \rtimes \ltimes \ltimes, acb, bac, cbd, cab, aba, bd\ltimes, d \ltimes \ltimes\}$

1. eee
2. ε
3. baaada
4. dcdaaaa

Solution
[1]

Exercise 229.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, cc, ba, cb, ab, aa, b\ltimes\}$

1. cbcbcca
2. baaab
3. cb
4. ε

Solution
[2]

Exercise 230.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ecd, bbd, bed, bba, ccc, dbb, bcd, cec\}$

1. cbcbbbabec
2. ε
3. ddbda
4. bbbbc

Solution
[1, 2, 3]

Exercise 231.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes ab, \rtimes \rtimes b\ltimes, \rtimes aba, \rtimes b \ltimes \ltimes, baaa, baab, abbb, aabb, abaa, bbba, aaab, bbaa, aba\ltimes, aab\ltimes, ba \ltimes \ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. aab
2. babbbaaaa
3. aababba
4. abababbaab

Solution
[]

Exercise 232.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes ba, \rtimes\rtimes bb, \rtimes baa, \rtimes bbb, aabb, aaab, abba, baaa, bbaa, baab, bba\ltimes, bbb\ltimes, bb\ltimes\ltimes, ba\ltimes\ltimes, a\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. ε
2. bbb
3. baaabba
4. baabba

Solution
[1, 2, 3]

Exercise 233.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes ba, \rtimes\rtimes b\ltimes, \rtimes bab, \rtimes b\ltimes\ltimes, bbba, babb, abbb, bbab, bab\ltimes, ab\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. abbbaa
2. bbbbaa
3. ab
4. baabbba

Solution
[]

Exercise 234.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes e, ce, ba, ec, ea, ae, eb, a\ltimes, b\ltimes\}$

1. ece
2. ba

3. b
4. ea

Solution
[1, 2, 3]

Exercise 235.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes ba, \rtimes \rtimes cd, \rtimes \rtimes bc, \rtimes cda, \rtimes bcb, \rtimes ba\ltimes, baaa, bcba, cbaa, aaa\ltimes, cda\ltimes, aa \ltimes \ltimes, da \ltimes \ltimes, ba \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. ε
2. ddab
3. abbd
4. dcd

Solution
[]

Exercise 236.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{caca, cbac, bbba, bacb\}$

1. abcbb
2. bb
3. b
4. ε

Solution
[0, 1, 2, 3]

Exercise 237.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ba, bb, ab, aa, a\ltimes, b\ltimes\}$

1. aaabbbb
2. a
3. bbaa
4. ε

Solution
[0, 1, 3]

Exercise 238.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bac, cbc, bab, aac, cbb\}$

1. ε
2. aaacac
3. bcbccbb
4. abaac

Solution
[0]

Exercise 239.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes bb, \rtimes \rtimes ca, \rtimes \rtimes \ltimes \ltimes, \rtimes bbc, \rtimes cab, \rtimes \ltimes \ltimes \ltimes, baba, abac, bacb, cccb, ccba, acbc, bbcc, cbab, bccc, cab\ltimes, cbc\ltimes, bc\ltimes \ltimes, ab\ltimes \ltimes, b \ltimes \ltimes \ltimes, c \ltimes \ltimes \ltimes\}$

1. ε
2. cbb
3. bcbaccacccc
4. cab

Solution
[0, 3]

Exercise 240.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bba, cac, bab, aba, bbc, bcc\}$

1. a
2. b
3. ε
4. cc

Solution
[0, 1, 2, 3]

Exercise 241.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dade, aabd, eaac, debe, eebb, deba\}$

1. ε
2. b
3. cbda
4. ca

Solution
[0, 1, 2, 3]

Exercise 242.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, bae, dca, cad, deb\}$

1. ε
2. badce
3. b
4. cb

Solution
[0, 1, 2, 3]

Exercise 243.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, cc, dc, cd, dd, d\ltimes\}$

1. cdbbab
2. cba
3. dbcb
4. bdbdac

Solution
[]

Exercise 244.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{dd, dc, bc, aa\}$

1. a
2. ee
3. b
4. ε

Solution
[0, 1, 2, 3]

Exercise 245.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes a, \rtimes\ltimes, cc, bb, ba, cb, ac, aa, a\ltimes, b\ltimes\}$

1. b
2. aaabaab
3. a
4. ε

Solution
[2, 3]

Exercise 246.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ecd, cbc, abd, cab, dda\}$

1. edcccb
2. a
3. ε
4. b

Solution
[0, 1, 2, 3]

Exercise 247.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, bbb, aac, bab, aca\}$

1. cc
2. b

3. abc
4. ε

Solution
[0, 1, 2, 3]

Exercise 248.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes\!\ltimes, ba, cb, ac, ea, dc, ad, dd, ee, c\ltimes\}$

1. eac
2. dadabdcea
3. eadc
4. ε

Solution
[0, 2, 3]

Exercise 249.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes ce, eee, cee, dbb, bce, edb, bbc, ced, ee\ltimes, e \ltimes \ltimes\}$

1. ceeee
2. abbeadaea
3. cee
4. ceee

Solution
[0, 2, 3]

Exercise 250.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, \rtimes\!\ltimes, cc, bb, ba, cb, ac, ca, bc, ab, a\ltimes, b\ltimes\}$

1. b
2. bb
3. bbbcccab
4. ε

Solution

[0, 1, 2, 3]

Exercise 251.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ad, be, ac, ee\}$

1. cbdebcda
2. edbadacdeb
3. ε
4. ddeeceaee

Solution
[0, 2]

Exercise 252.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, cc, ba, bb, cb, bc, a\ltimes\}$

1. c
2. b
3. bacbcca
4. ε

Solution
[]

Exercise 253.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aabb, abba, bbab, aaba\}$

1. a
2. b
3. ε
4. bbaaaabaa

Solution
[0, 1, 2]

Exercise 254.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes d, \rtimes\rtimes\ltimes, \rtimes dd, \rtimes d\ltimes, \rtimes\ltimes\ltimes, dac, baa, abb, bba, aab, cbb, cec, ace, ecb, dda, bb\ltimes, d\ltimes\ltimes, b\ltimes\ltimes\}$

1. d
2. ddacecbb
3. cbaedaa
4. ε

Solution
[0, 1, 3]

Exercise 255.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{babb, abab, aaab, baab\}$

1. bbbb
2. baa
3. b
4. ε

Solution
[0, 1, 2, 3]

Exercise 256.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bb, ad, de, ed, bc, db\}$

1. aeeddeeec
2. bbadabdecd
3. ε
4. abeddbcac

Solution
[2]

Exercise 257.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes db, \rtimes \rtimes da, \rtimes \rtimes ab, \rtimes \rtimes d\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes dbd, \rtimes daa, \rtimes ab\ltimes, \rtimes d \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, ddcc, bded, bddc, cccb, dbdd, dccc, cbde, ccbd, daa\ltimes, ded\ltimes, aa \ltimes \ltimes, ed \ltimes \ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. ε
2. dbaedb
3. d
4. ab

Solution
[0, 2, 3]

Exercise 258.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ac, dd, ca, dc, cd, ad, ab\}$

1. bbdccbad
2. dcbaccad
3. bababbab
4. dbda

Solution
[3]

Exercise 259.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes \rtimes c, \rtimes cd, \rtimes aa, \rtimes b\ltimes, dcd, cdc, aa\ltimes, cd\ltimes, d \ltimes \ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. a
2. ε
3. ddb
4. bcadbc

Solution
[]

Exercise 260.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ab, \rtimes aba, cccc, ccca, abcc, ccac, abab, bccc, babc, cac\ltimes, ac \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. ababcccac
2. cbb
3. ccbbbc
4. bcac

Solution
[0]

Exercise 261.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{be, ac, ea, dc, ca, eb, aa\}$

1. bb
2. ae
3. ε
4. b

Solution
[0, 1, 2, 3]

Exercise 262.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cbc, dcc, aed, bde, cde, dea, ebc\}$

1. aabccda
2. adde
3. ε
4. b

Solution
[0, 1, 2, 3]

Exercise 263.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bac, baa, bbb, ccc, cbc, abc, cab\}$

1. accba
2. b
3. babcb
4. ε

Solution
[0, 1, 3]

Exercise 264.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ab, \rtimes \rtimes \ltimes\ltimes, \rtimes abb, \rtimes \ltimes \ltimes\ltimes, bbba, babb, abbb, abba, bbaa, bbab, baab, aab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. babaabbaba
2. abbbaab
3. abbaab
4. ε

Solution
[1, 2, 3]

Exercise 265.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes bb, \rtimes a\ltimes, baa, bbb, bba, bab, aab, aba, ab\ltimes, bb\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. abb
2. bbbb
3. bb
4. a

Solution
[1, 2, 3]

Exercise 266.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ac, \rtimes \rtimes \ltimes\ltimes, \rtimes acb, \rtimes \ltimes \ltimes\ltimes, bbac, acbb, cbba, abcc, baca, acab, cabc, bcc\ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. aa

2. ε
3. acba
4. bacaaacaac

Solution
[1]

Exercise 267.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ac, db, ca, bd, cd, ad, dc, da, c\ltimes\}$

1. c
2. cdc
3. cac
4. cbaa

Solution
[0, 1, 2]

Exercise 268.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bccb, baaa, baca, deae, bdcd\}$

1. cca
2. cdceaeb
3. abbad
4. addbc

Solution
[0, 1, 2, 3]

Exercise 269.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes d, \rtimes dd, \rtimes c\ltimes, aba, ede, dea, ced, ddc, eab, dce, ba\ltimes, c \ltimes \ltimes, a \ltimes \ltimes\}$

1. c
2. cdcda
3. d
4. ceaae

Solution
[0]

Exercise 270.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ba, bb, ab, aa, a\ltimes\}$

1. b
2. aa
3. aaababbba
4. bbbbbabb

Solution
[1, 2]

Exercise 271.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ab, \rtimes c\ltimes, \rtimes \ltimes \ltimes, bcc, acb, abb, cbc, cac, bab, aba, cca, bbc, cc\ltimes, c \ltimes \ltimes\}$

1. babaca
2. abcabbbabbcb
3. b
4. ε

Solution
[3]

Exercise 272.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bdb, bbd, dca, bcd, dac, dcb\}$

1. b
2. dada
3. ε
4. bbabc

Solution
[0, 1, 2, 3]

Exercise 273.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baba, abba, abaa, abbb\}$

1. b
2. ababbb
3. ε
4. aabbaabb

Solution
[0, 2]

Exercise 274.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ab, \rtimes \ltimes \ltimes, baa, bab, aab, aba, ab\ltimes, b \ltimes \ltimes\}$

1. ab
2. b
3. bb
4. ε

Solution
[0, 3]

Exercise 275.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, bbb, aca, caa, aaa\}$

1. ε
2. ca
3. aaa
4. b

Solution
[0, 1, 3]

Exercise 276.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes b, cc, ba, ac, ca, ab, aa, c\ltimes, b\ltimes\}$

1. b
2. ε
3. acbaabb
4. aaacccc

Solution
[0]

Exercise 277.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes d, \rtimes \rtimes \ltimes, \rtimes dc, \rtimes c\ltimes, \rtimes \ltimes \ltimes, cda, dcd, acc, ccc, dac, cc\ltimes, c \ltimes \ltimes\}$

1. dcdab
2. ac
3. ε
4. adbadd

Solution
[2]

Exercise 278.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes a, \rtimes\rtimes\ltimes, \rtimes aa, \rtimes ab, \rtimes\ltimes\ltimes, bba, bab, adc, ccb, dcc, cbb, aba, aad, ab\ltimes, ba\ltimes, a\ltimes \ltimes, b \ltimes \ltimes\}$

1. ε
2. ab
3. a
4. adcad

Solution
[0, 1]

Exercise 279.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ba, bb, cb, ac, bc, ab, b\ltimes\}$

1. abccacbbabca

2. bbabaaccbb
3. baaaba
4. ε

Solution
[3]

Exercise 280.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cadc, bdbb, dcdd, caaa, bdaa\}$

1. addcdd
2. ε
3. dd
4. abb

Solution
[1, 2, 3]

Exercise 281.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{adb, bcc, abc, dad\}$

1. aadccc
2. bcc
3. a
4. ε

Solution
[0, 2, 3]

Exercise 282.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes c, \rtimes\ltimes, cc, ba, cb, ac, dc, ca, cd, ad, aa, c\ltimes, d\ltimes\}$

1. cbdbccddaad
2. abcbcdddadb
3. bcccbbd
4. abcd

Solution
[]

Exercise 283.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, bb, ba, ab, aa, a\ltimes, b\ltimes\}$

1. a
2. bbbaabaaa
3. bb
4. b

Solution
[0, 1, 2, 3]

Exercise 284.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cc, ea, ed, ca, bd, bc, da\}$

1. bab
2. bbcbcbc
3. abbabba
4. e

Solution
[0, 2, 3]

Exercise 285.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aca, bba, cbb, cac\}$

1. a
2. ε
3. b
4. cabaabac

Solution
[0, 1, 2, 3]

Exercise 286.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes \ltimes \ltimes, baa, abb, bab, aab, aba, aaa, bb\ltimes, b \ltimes \ltimes\}$

1. b
2. ε
3. aaaa
4. bbaabb

Solution
[1]

Exercise 287.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes a, \rtimes\rtimes\ltimes, \rtimes bb, \rtimes a\ltimes, \rtimes\ltimes\ltimes, baa, bba, aab, aaa, ab\ltimes, a\ltimes\ltimes, b\ltimes\ltimes\}$

1. abbbb
2. a
3. ε
4. bbaab

Solution
[1, 2, 3]

Exercise 288.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{eee, bdd, dca, cbc, eba, bce, cdd\}$

1. b
2. c
3. adeae
4. ε

Solution
[0, 1, 2, 3]

Exercise 289.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes \rtimes d, \rtimes dc, cda, bca, dcd, abc, cac, dab, ac\ltimes, c \ltimes \ltimes\}$

1. ε
2. deacccb
3. ab
4. dddc

Solution
[]

Exercise 290.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ba, \rtimes \rtimes \ltimes\ltimes, \rtimes bab, \rtimes \ltimes \ltimes\ltimes, baba, babb, aaab, abba, baaa, abab, abaa, bbab, aab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. bbaa
2. aa
3. aabbabbabb
4. abbbbabbb

Solution
[]

Exercise 291.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes aa, \rtimes \rtimes ab, \rtimes \rtimes \ltimes\ltimes, \rtimes aaa, \rtimes abb, \rtimes aa\ltimes, \rtimes \ltimes \ltimes\ltimes, baba, abbb, aaba, abab, bbba, aaab, babb, bba\ltimes, abb\ltimes, aa \ltimes \ltimes, bb \ltimes \ltimes, ba \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. aa
2. ε
3. aaabbaa
4. abb

Solution
[0, 1, 3]

Exercise 292.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{babb, bbba, bbbb, aaaa, bbaa, abab\}$

1. aaaa
2. bbbaab
3. bbaa
4. ε

Solution
[3]

Exercise 293.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ab, \rtimes \rtimes a\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes aba, \rtimes a \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, baaa, abcb, acab, aaca, aaac, abaa, cabc, bcb\ltimes, cb \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. acbc
2. ε
3. b
4. a

Solution
[1, 3]

Exercise 294.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes bc, \rtimes \rtimes ab, \rtimes \rtimes ca, \rtimes cac, \rtimes bcc, \rtimes ab\ltimes, acba, bacb, abbb, cbac, cacb, babb, cbab, bbb\ltimes, bcc\ltimes, bb\ltimes \ltimes, cc \ltimes \ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. bcc
2. bc
3. cacbabbb
4. ab

Solution
[0, 2, 3]

Exercise 295.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes \rtimes d, \rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ad, \rtimes d\ltimes, \rtimes \ltimes \ltimes, bcc, bca, dbc, cac, abc, adb, aca, cab, cc\ltimes, c \ltimes \ltimes, d \ltimes \ltimes\}$

1. acbacacc
2. ε
3. d
4. adbcc

Solution
[1, 2, 3]

Exercise 296.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bbac, cbba, cccb, caaa, acca, bcbc, cbab\}$

1. bacc
2. bbbbcacca
3. b
4. ε

Solution
[0, 2, 3]

Exercise 297.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, cc, ba, cb, ac, dc, cd, da, c\ltimes\}$

1. dc
2. dcc
3. dca
4. cddcbbb

Solution
[0, 1]

Exercise 298.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes cc, \rtimes \ltimes \ltimes, bca, bcb, cba, cbc, bab, abc, ccb, caa, aab, ab\ltimes, b \ltimes \ltimes\}$

1. ε
2. ccbcaab
3. bb
4. ccbab

Solution
[0, 1, 3]

Exercise 299.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, bbb, acc, ccc, caa, aba, bbc, bcc\}$

1. b
2. ε
3. a
4. aabacccba

Solution
[0, 1, 2]

Exercise 300.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bc, bca, dcb, cbc, cdc, bcd, ca\ltimes, a \ltimes \ltimes\}$

1. ddd
2. bdd
3. cb
4. bcb

Solution
[]

Exercises with n-gram grammars

Exercise 301.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes dd, \rtimes d\ltimes, dbe, dbb, add, dda, dad, bbd, bdb, ddb, ebd, beb, bd\ltimes, d \ltimes \ltimes\}$

1. e

2. b
3. dacedcddba
4. edbcaeaebc

Solution
ε

Exercise 302.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes\!\ltimes, db, ca, ad, dc, dd, ba, aa, a\ltimes\}$

1. c
2. bdcdcdcd
3. caacdcdcb
4. bbaccdcab

Solution
ε

Exercise 303.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes \rtimes b\ltimes, \rtimes bbb, \rtimes b \ltimes \ltimes, bbaa, baab, aaba, abab, bbbb, bbba, bab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. babb
2. babab
3. bba
4. aababbb

Solution
ε

Exercise 304.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, aa, ab, bb\}$

1. abab
2. ababb
3. aabbb
4. baaa

Solution
ε

Exercise 305.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes ee, \rtimes \rtimes ae, \rtimes \rtimes \ltimes \ltimes, \rtimes aed, \rtimes eee, \rtimes ae \ltimes, \rtimes \ltimes \ltimes \ltimes, aedd, eddd, dddd, eee \ltimes, ddd \ltimes, ee \ltimes \ltimes, ae \ltimes \ltimes, dd \ltimes \ltimes, d \ltimes \ltimes \ltimes, e \ltimes \ltimes \ltimes\}$

1. cbbace
2. dcdc
3. cda
4. aee

Solution
ε

Exercise 306.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes ba, \rtimes ab, \rtimes a \ltimes, bac, abc, bca, cbc, aba, acb, cab, ba \ltimes, bc \ltimes, c \ltimes \ltimes, a \ltimes \ltimes\}$

1. ε
2. aaabbbbb
3. acbcbabb
4. bbcbc

Solution
ε

Exercise 307.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes bb, \rtimes \rtimes a \ltimes, \rtimes \rtimes \ltimes \ltimes, \rtimes bba, \rtimes a \ltimes \ltimes, \rtimes \ltimes \ltimes \ltimes, bbaa, baaa, aaac, aac \ltimes, ac \ltimes \ltimes, c \ltimes \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. aabbb
2. cac
3. ccacaa
4. abac

Solution

ε

Exercise 308.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes bc, \rtimes bcb, bcec, cbce, cecd, ddab, bcbc, ecdd, cdda, dab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. c
2. eedb
3. bbab
4. cabccc

Solution
ε

Exercise 309.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes d, \rtimes\ltimes, ad, dc, cd, cb, ba, d\ltimes\}$

1. badade
2. db
3. aadab
4. a

Solution
ε

Exercise 310.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes bc, \rtimes \ltimes \ltimes, ada, bcd, aba, cab, dca, cdd, bad, ddc, aa\ltimes, da\ltimes, a \ltimes \ltimes\}$

1. d
2. ccdacadda
3. dddccbca
4. adccc

Solution
ε

Exercise 311.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes\ltimes, db, ad, dc, cd, bc, dd, ba, c\ltimes\}$

1. c
2. dacdccc
3. daadbba
4. cdcdc

Solution
ε

Exercise 312.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes db, \rtimes dbb, dbbd, bbda, dacd, bdac, acd\ltimes, cd \ltimes \ltimes, d \ltimes \ltimes\ltimes\}$

1. e
2. ee
3. dedebec
4. ε

Solution
ε

Exercise 313.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ca, \rtimes aa, \rtimes a\ltimes, \rtimes \ltimes \ltimes, dda, bbb, abb, cab, bbd, bdd, ddd, da\ltimes, aa\ltimes, a \ltimes \ltimes\}$

1. ab
2. c
3. bcb
4. bcc

Solution
ε

Exercise 314.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes d, \rtimes\ltimes, ab, ca, da, ce, ee, bc, ac, ec, b\ltimes\}$

1. deadbdcacd
2. ebbeccd
3. c
4. addbd

Solution
ε

Exercise 315.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes e, \rtimes\rtimes\rtimes c, \rtimes\rtimes eb, \rtimes\rtimes cb, \rtimes ebd, \rtimes cb\ltimes, ebda, bdac, acdb, dacd, cdb\ltimes, db\ltimes\ltimes, cb\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. eaaabed
2. ab
3. ecbcad
4. b

Solution
ε

Exercise 316.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes a, \rtimes ad, acd, ada, aac, daa, cd\ltimes, d\ltimes\ltimes\}$

1. ε
2. ceeaab
3. bead
4. bcda

Solution
ε

Exercise 317.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes cc, \rtimes\rtimes b\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes cca, \rtimes cc\ltimes, \rtimes b\ltimes\ltimes, \rtimes\ltimes\ltimes\ltimes, cabc, abcc, caca, bcca, ccab, ccac, aca\ltimes, ca\ltimes\ltimes, cc\ltimes\ltimes, c\ltimes\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

$\ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abcb
2. bbaaa
3. bccbbbaab
4. cacaca

Solution
ε

Exercise 318.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ca, \rtimes ab, \rtimes b\ltimes, \rtimes \ltimes \ltimes, abc, bca, acc, ccc, cac, ca\ltimes, cc\ltimes, c \ltimes \ltimes, b \ltimes \ltimes, a \ltimes \ltimes\}$

1. bca
2. bcabbab
3. ccc
4. cab

Solution
ε

Exercise 319.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes d, \rtimes \rtimes \ltimes, \rtimes dc, \rtimes c\ltimes, \rtimes \ltimes \ltimes, edd, ced, ddb, dce, db\ltimes, dc\ltimes, c \ltimes \ltimes, b \ltimes \ltimes\}$

1. d
2. badbca
3. addcb
4. ea

Solution
ε

Exercise 320.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes d, \rtimes \ltimes, db, bd, cd, de, dd, cc, ec, d\ltimes, c\ltimes\}$

1. acbde
2. bbc
3. acaca
4. de

Solution
ε

Exercise 321.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes ba, aae, aeb, bcc, dad, ebc, baa, ccd, cda, ad\ltimes, d \ltimes \ltimes\}$

1. badccedbde
2. ε
3. dbdc
4. bbcdd

Solution
ε

Exercise 322.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes db, \rtimes \rtimes b\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes dbc, \rtimes b \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, bdbb, cdca, bcdc, cabb, abbd, dbcd, dcab, bbdb, dbb\ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. a
2. bbdcddd
3. acdacaac
4. dbbbd

Solution
ε

Exercise 323.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes aa, bab, aab, aba, abb, bba, bb\ltimes, b \ltimes \ltimes\}$

1. bb
2. aaa
3. bbbabba

4. bababb

Solution
ε

Exercise 324.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bb, \rtimes \rtimes \ltimes\ltimes, \rtimes bbe, \rtimes \ltimes \ltimes\ltimes, beab, eabe, bbea, eeaa, abee, beea, eaae, aae\ltimes, ae \ltimes \ltimes, e \ltimes \ltimes\ltimes\}$

1. ebbb
2. cecc
3. bccedecd
4. ab

Solution
ε

Exercise 325.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes bc, \rtimes\rtimes aa, \rtimes\rtimes b\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes aaa, \rtimes bc\ltimes, \rtimes b\ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, baaa, aaba, acca, aaab, aacc, ccab, abaa, aaac, cab\ltimes, bc \ltimes \ltimes, ab \ltimes \ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bccaaa
2. bca
3. acaab
4. babcbcaaaa

Solution
ε

Exercise 326.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ab, \rtimes \rtimes c\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes aba, \rtimes c \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, bbcb, bcba, bacb, cbbb, acbb, abac, bbbc, cba\ltimes, ba \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. aacabcaba
2. abcbbabacb
3. cbcbcbab

4. cbbcabaccb

Solution
ε

Exercise 327.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes aa, abc, bab, aab, bca, aba, ca\ltimes, a \ltimes \ltimes\}$

1. cbbcca
2. aabbabb
3. ε
4. cbb

Solution
ε

Exercise 328.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes c, \rtimes cc, \rtimes bc, ccb, bcc, cba, cbc, ccc, baa, bcb, cc\ltimes, aa\ltimes, c\ltimes\ltimes, a\ltimes\ltimes\}$

1. bccbbccaa
2. accacbbcb
3. ccbbba
4. aca

Solution
ε

Exercise 329.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ab, ca, cb, bc, ac, ba, aa, a\ltimes\}$

1. baaabcaaba
2. ccaba
3. b
4. bcb

Solution
ε

Exercise 330.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes a, bd, da, cb, aa, a\ltimes\}$

1. da
2. ddbcdc
3. ccada
4. dac

Solution
ε

Exercise 331.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ab, cb, bc, ba, a\ltimes\}$

1. dbaaaa
2. eceecdb
3. ebdead
4. e

Solution
ε

Exercise 332.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes\ltimes, \rtimes bb, \rtimes b\ltimes, \rtimes\ltimes\ltimes, aab, bbb, abb, baa, bba, aaa, aa\ltimes, b\ltimes\ltimes, a\ltimes\ltimes\}$

1. baaabbbaaa
2. bababb
3. baaaabaa
4. aaaabbababab

Solution
ε

Exercise 333.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes a, \rtimes d, \rtimes\ltimes, ab, db, ad, dc, dd, ba, aa, bb, d\ltimes, c\ltimes\}$

1. daedec
2. eabcdebab
3. cebdaa
4. cecabeaa

Solution
ε

Exercise 334.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ab, ca, ba, ac, cc, aa, bb, b\ltimes\}$

1. a
2. ε
3. bcbba
4. cbcbaaa

Solution
ε

Exercise 335.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ab, ca, ba, aa, a\ltimes\}$

1. abbbcaa
2. cbbbc
3. ε
4. baba

Solution
ε

Exercise 336.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bd, eec, bdc, acc, dde, dee, dca, ccd, cdd, cac, ddd, ec\ltimes, c \ltimes \ltimes\}$

1. accaedcdce
2. aeeaabbdd

3. ε
4. dcabeadeabc

Solution
ε

Exercise 337.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes a, \rtimes\rtimes\ltimes, \rtimes ad, \rtimes b\ltimes, \rtimes\ltimes\ltimes, dda, adc, cdd, daa, dcd, aaa, aa\ltimes, b\ltimes \ltimes, a \ltimes \ltimes\}$

1. ecdcaee
2. bddceedd
3. caeaedae
4. aada

Solution
ε

Exercise 338.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes eb, \rtimes eba, ebad, adce, ccba, dcec, badc, cecc, eccb, cba\ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. becadbb
2. eceeccaa
3. cbdcaaa
4. ccaa

Solution
ε

Exercise 339.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes c, \rtimes cb, \rtimes d\ltimes, cba, abc, bab, bcd, cdb, dba, ba\ltimes, d \ltimes \ltimes, a \ltimes \ltimes\}$

1. c
2. bcda
3. eeccbaba
4. bbd

Solution
ε

Exercise 340.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes ca, \rtimes caa, caaa, acbd, aacb, cbdc, aaac, bdc\ltimes, dc \ltimes \ltimes, c \ltimes \ltimes \ltimes\}$

1. ε
2. ccdddbba
3. acaba
4. ddaacc

Solution
ε

Exercise 341.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes cc, \rtimes \ltimes \ltimes, bcc, ccb, cbc, ceb, cce, bb\ltimes, eb\ltimes, b \ltimes \ltimes\}$

1. cabeecc
2. accbbb
3. dda
4. aed

Solution
ε

Exercise 342.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes a, ca, ad, da, ac, aa, e\ltimes, a\ltimes\}$

1. c
2. bdebea
3. ee
4. acaea

Solution
ε

Exercise 343.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes ab, \rtimes\rtimes aa, \rtimes aaa, \rtimes abb, bbaa, abbb, bbbb, bbba, aaa\ltimes, baa\ltimes, aa\ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. babaa
2. abaaabb
3. abab
4. aaaaaaa

Solution
ε

Exercise 344.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ab, \rtimes \rtimes b\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes abb, \rtimes ab\ltimes, \rtimes b \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, baab, aabb, bbaa, abba, bba\ltimes, ba \ltimes \ltimes, ab \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. aabb
2. ba
3. bab
4. bbabb

Solution
ε

Exercise 345.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes bc, \rtimes \rtimes ab, \rtimes \rtimes a\ltimes, \rtimes bcc, \rtimes abb, \rtimes a \ltimes \ltimes, caab, bbca, bcaa, bccb, ccbb, cbbc, aab\ltimes, abb\ltimes, ab \ltimes \ltimes, bb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. baccc
2. aab
3. bacbcabba
4. cbcccaa

Solution
ε

Exercise 346.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes ca, bac, bca, aba, cbb, bbb, acb, cab, bbc, ab\ltimes, b \ltimes \ltimes\}$

1. baacbacc
2. bac
3. a
4. bbbabbbccab

Solution
ε

Exercise 347.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes d, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes d\ltimes, \rtimes \ltimes \ltimes, bdc, bca, dcc, abb, cab, bbd, bbc, caa, cca, aa\ltimes, d \ltimes \ltimes, a \ltimes \ltimes\}$

1. cbcadaaca
2. caadd
3. caadb
4. babbad

Solution
ε

Exercise 348.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, db, ad, bb, dd, ba, aa, a\ltimes\}$

1. babbabd
2. abaa
3. accc
4. ε

Solution
ε

Exercise 349.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes \ltimes \ltimes, aab, aba, abb, baa, bba, aaa, ba\ltimes, a \ltimes \ltimes\}$

1. bb
2. ba
3. ababbaba
4. abbabb

Solution
ε

Exercise 350.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes c, \rtimes ca, \rtimes b\ltimes, ccb, bcc, cba, bab, abb, cab, bbc, bcb, cb\ltimes, b \ltimes \ltimes\}$

1. bbbabbbba
2. bcbcac
3. cb
4. cbbbacabc

Solution
ε

Exercise 351.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ca, \rtimes \rtimes dd, \rtimes \rtimes \ltimes\ltimes, \rtimes cad, \rtimes dd\ltimes, \rtimes \ltimes \ltimes\ltimes, cdbb, dbbd, cadd, ddbc, addb, bbdc, dbcd, bcdb, bdc\ltimes, dd \ltimes \ltimes, dc \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. dccbac
2. cdcdba
3. ab
4. b

Solution
ε

Exercise 352.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes d, \rtimes \rtimes eb, \rtimes \rtimes bd, \rtimes \rtimes ab, \rtimes \rtimes$

$d\ltimes, \rtimes bde, \rtimes ebe, \rtimes ab\ltimes, \rtimes d \ltimes \ltimes, bece, ecee, ebec, ceeb, eeb\ltimes, bde\ltimes, ab \ltimes \ltimes, de \ltimes \ltimes, eb \ltimes \ltimes, d \ltimes \ltimes\ltimes, e \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. baecdcd
2. caedbcc
3. becceab
4. bdcca

Solution
ε

Exercise 353.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baa, aab, bab, abb\}$

1. babaab
2. baaba
3. aaaaabbbbb
4. bbbbabba

Solution
ε

Exercise 354.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes bc, \rtimes \rtimes ac, \rtimes \rtimes c\ltimes, \rtimes aca, \rtimes bc\ltimes, \rtimes c \ltimes \ltimes, baab, aabc, caba, abca, bcaa, abaa, acab, caa\ltimes, bc \ltimes \ltimes, aa \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. bbcb
2. cbbc
3. acbbcaab
4. aa

Solution
ε

Exercise 355.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes bb, \rtimes \rtimes ac, \rtimes \rtimes ca, \rtimes \rtimes$

$c\ltimes, \rtimes acc, \rtimes bbb, \rtimes ca\ltimes, \rtimes c \quad \ltimes \quad \ltimes, baab, bbba, aabc, bbaa, acc\ltimes, abc\ltimes, ca \quad \ltimes \ltimes, bc \ltimes \ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. adbcbda
2. ε
3. cb
4. adb

Solution
ε

Exercise 356.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes ab, \rtimes c\ltimes, bcc, cba, ccb, abc, bab, ccc, cca, ca\ltimes, ab\ltimes, c \ltimes \ltimes, b \ltimes \ltimes, a \ltimes \ltimes\}$

1. bcaab
2. ε
3. cab
4. baaacacbb

Solution
ε

Exercise 357.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes ab, \rtimes ad, \rtimes b\ltimes, add, ada, dad, dcb, daa, bda, cbd, ddc, ab\ltimes, aa\ltimes, b\ltimes \ltimes, a \ltimes \ltimes\}$

1. cdbac
2. aaacadbc
3. aaddc
4. daab

Solution
ε

Exercise 358.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes \rtimes c, \rtimes ca, bac, cba, abb, cab, bbc, bcb, ac\ltimes, c \ltimes \ltimes\}$

1. a
2. ε
3. bbabbb
4. bacabbaa

Solution
ε

Exercise 359.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes aa, \rtimes aae, edcd, aedc, aaed, dcd\ltimes, cd \ltimes \ltimes, d \ltimes \ltimes\ltimes\}$

1. ebbdd
2. ε
3. dedcad
4. dacc

Solution
ε

Exercise 360.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, ab, bb, ba, aa, a\ltimes\}$

1. aaabb
2. ab
3. aababab
4. ε

Solution
ε

Exercise 361.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ab, aa, be, da, cb, ac, dd, ba, e\ltimes\}$

1. adcbcc
2. bccdaba

3. ede
4. acee

Solution
ε

Exercise 362.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \ \rtimes \ \rtimes a, \rtimes \ \rtimes \ \rtimes c, \rtimes \ \rtimes \ \rtimes \ltimes, \rtimes \ \rtimes \ cb, \rtimes \ \rtimes \ aa, \rtimes \ \rtimes \ cc, \rtimes \ \rtimes \ \ltimes\ltimes, \rtimes aab, \rtimes ccc, \rtimes cb\ltimes, \rtimes \ltimes\ltimes, bcab, cabb, bbca, abba, cccb, ccbb, cbbc, aab\ltimes, bba\ltimes, ba \ltimes \ltimes, ab \ltimes \ltimes, cb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abcba
2. ca
3. baccaaabbc
4. bccacbba

Solution
ε

Exercise 363.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \ \rtimes \ \rtimes a, \rtimes \ \rtimes \ \rtimes b, \rtimes \ \rtimes \ ab, \rtimes \ \rtimes \ bb, \rtimes \ \rtimes \ a\ltimes, \rtimes bbb, \rtimes abb, \rtimes a \ltimes \ltimes, bbaa, abba, baaa, aaaa, aaa\ltimes, bbb\ltimes, aa \ltimes \ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. aaaaba
2. abbab
3. ε
4. b

Solution
ε

Exercise 364.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes ab, acd, bac, abc, cba, cdd, dcd, bcb, cda, ddc, da\ltimes, a \ltimes \ltimes\}$

1. dbabcbbccaa
2. dbdacab

3. dabbbbdaac
4. ab

Solution
ε

Exercise 365.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\ltimes, ab, ca, ac, ba, a\ltimes\}$

1. ca
2. abab
3. a
4. abcac

Solution
ε

Exercise 366.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes ab, \rtimes abb, bbac, abba, bacb, acbc, cbca, bcaa, caa\ltimes, aa\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. ε
2. acbbabbc
3. aac
4. bcbbbbccb

Solution
ε

Exercise 367.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes d, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes dc, \rtimes\rtimes ba, \rtimes\rtimes d\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes bab, \rtimes dc\ltimes, \rtimes d\ltimes\ltimes, \rtimes\ltimes\ltimes\ltimes, abcb, babc, bcbc, cbc\ltimes, bc\ltimes\ltimes, dc\ltimes\ltimes, c\ltimes\ltimes\ltimes, d\ltimes\ltimes\ltimes\}$

1. bcb
2. cababb
3. bd
4. a

Solution
ε

Exercise 368.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes a, \rtimes\rtimes ab, \rtimes\rtimes ca, \rtimes aba, \rtimes cab, bacc, cccc, abac, accc, cab\ltimes, ccc\ltimes, cc\ltimes\ltimes, ab\ltimes\ltimes, b\ltimes\ltimes\ltimes, c\ltimes\ltimes\ltimes\}$

1. ccc
2. ε
3. a
4. bbbaaac

Solution
ε

Exercise 369.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ab, ca, ba, cb, bc, ac, cc, aa, bb, b\ltimes\}$

1. bac
2. cbcacccccc
3. cc
4. ε

Solution
ε

Exercise 370.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes b, \rtimes\rtimes cc, \rtimes\rtimes bc, \rtimes ccc, \rtimes bcc, cabc, bcca, ccab, abc\ltimes, ccc\ltimes, bc\ltimes\ltimes, cc\ltimes\ltimes, c\ltimes\ltimes\ltimes\}$

1. aaacaa
2. a
3. b
4. cbcb

Solution
ε

Exercise 371.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, db, ad, dc, cd, cc, b\ltimes\}$

1. bac
2. c
3. dac
4. abdb

Solution
ε

Exercise 372.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes d, \rtimes\rtimes db, \rtimes\rtimes cb, \rtimes cbb, \rtimes dba, babd, baba, bdbc, bccc, abdb, dbcc, abab, dbab, ccc\ltimes, cbb\ltimes, bb\ltimes\ltimes, c\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. bac
2. cbabdbb
3. cacaabd
4. badddaba

Solution
ε

Exercise 373.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes b, db, ca, ad, da, cd, bb, bc, cc, aa, b\ltimes, a\ltimes\}$

1. dabdb
2. cbccaaaccc
3. acbbcababa
4. aaa

Solution
ε

Exercise 374.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes da, bab, bea, abe, eae, eba, ceb, ace, dac, ae\ltimes, e \ltimes \ltimes\}$

1. bcedceca
2. b
3. dbd
4. aabaaadccd

Solution
ε

Exercise 375.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes ee, \rtimes eec, cdce, ecdc, eecd, dce\ltimes, ce \ltimes \ltimes, e \ltimes \ltimes\ltimes\}$

1. ε
2. adbe
3. cce
4. adecd

Solution
ε

Exercise 376.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, cb, bb, bc, cc, ba, aa, a\ltimes\}$

1. abbaa
2. b
3. ε
4. bbbbb

Solution
ε

Exercise 377.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes bbb, bbaa, baaa, bbba, aaa\ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. aab
2. ε

3. a
4. bbaa

Solution
ε

Exercise 378.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes e, \rtimes\rtimes\rtimes d, \rtimes\rtimes ed, \rtimes\rtimes dd, \rtimes dda, \rtimes ede, edde, eedd, deed, ddeb, edee, deb\ltimes, dda\ltimes, da\ltimes \ltimes, eb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bbdbeed
2. debca
3. ddca
4. ε

Solution
ε

Exercise 379.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bb, \rtimes \rtimes \ltimes\ltimes, \rtimes bbc, \rtimes \ltimes \ltimes\ltimes, ccca, bacb, caba, ccab, bccc, bbcc, cbac, abac, acba, bac\ltimes, ac \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. bbcabaab
2. acaabc
3. c
4. aba

Solution
ε

Exercise 380.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ac, \rtimes cc, \rtimes \ltimes \ltimes, cba, acb, baa, aca, aaa, cac, cc\ltimes, aa\ltimes, c \ltimes \ltimes, a \ltimes \ltimes\}$

1. bacabaacbcac
2. bacbcbca
3. acbabbbabbc

4. cacacbb

Solution
ε

Exercise 381.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes aa, cac, acd, aab, cda, dab, aba, aac, baa, aaa, aca, ab\ltimes, b \ltimes \ltimes\}$

1. cc
2. ad
3. ε
4. bdbdaaadcdad

Solution
ε

Exercise 382.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, db, ad, bd, dd, ba, d\ltimes\}$

1. cd
2. adbaba
3. dcbaac
4. aa

Solution
ε

Exercise 383.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bb, \rtimes ba, bab, aba, abb, bba, ba\ltimes, a \ltimes \ltimes\}$

1. aaaaa
2. bbbbababa
3. aaabba
4. babbabbab

Solution
ε

Exercise 384.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes b, ca, ad, dc, cb, bc, ac, b\ltimes, c\ltimes\}$

1. bbb
2. ac
3. dacacb
4. daadbddbb

Solution
ε

Exercise 385.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ab, ca, cb, bc, ac, ba, bb, b\ltimes\}$

1. ccbaba
2. aaba
3. bcbacacc
4. acccca

Solution
ε

Exercise 386.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bab, aab, bbb, abb, baa, bba\}$

1. aaabb
2. babbaa
3. bbabaa
4. aaab

Solution
ε

Exercise 387.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes a, \rtimes\ltimes, ca, ac, aa, c\ltimes\}$

1. aaaa
2. bacaaba
3. bcc
4. acaacbbc

Solution
ε

Exercise 388.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \quad \rtimes \quad \rtimes a, \rtimes \quad \rtimes \quad \rtimes b, \rtimes \quad \rtimes \quad \rtimes c, \rtimes \quad \rtimes \quad cb, \rtimes \quad \rtimes \quad ba, \rtimes \quad \rtimes$ $ab, \rtimes abc, \rtimes cbb, \rtimes ba \ltimes, baac, aacb, abca, caba, aaca, caac, bcaa, abaa, acab, acb \ltimes, cbb \ltimes, ba \ltimes$ $\ltimes, cb \ltimes \ltimes, bb \ltimes \ltimes, a \ltimes \ltimes \ltimes, b \ltimes \ltimes \ltimes\}$

1. b
2. c
3. bc
4. cbccabac

Solution
ε

Exercise 389.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes \rtimes ca, \rtimes cab, \rtimes cac, \rtimes bb \ltimes, babb, caba, abab, cac \ltimes, abb \ltimes, ac \ltimes$ $\ltimes, bb \ltimes \ltimes, c \ltimes \ltimes \ltimes, b \ltimes \ltimes \ltimes\}$

1. ε
2. caab
3. baca
4. b

Solution
ε

Exercise 390.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes b, \rtimes \rtimes cc, \rtimes \rtimes bc, \rtimes bcc, \rtimes cc \ltimes, bccb, babb, ccba, cbab, abbc, bbca, bcc \ltimes, bca \ltimes, ca \ltimes$ $\ltimes, cc \ltimes \ltimes, c \ltimes \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. aaccabbca
2. b
3. cba
4. ca

Solution
ε

Exercise 391.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes ce, \rtimes\rtimes cb, \rtimes cbd, \rtimes ce\ltimes, decc, cbba, bdec, cbde, ccbb, bbad, eccb, bad\ltimes, ce\ltimes \ltimes, ad \ltimes \ltimes, d \ltimes \ltimes\ltimes, e \ltimes \ltimes\ltimes\}$

1. a
2. bbaeacbcb
3. eab
4. c

Solution
ε

Exercise 392.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes bc, \rtimes \rtimes aa, \rtimes \rtimes cb, \rtimes \rtimes b\ltimes, \rtimes aaa, \rtimes bcb, \rtimes cb\ltimes, \rtimes b \ltimes\ltimes, aaab, aabc, abca, aacc, caac, bcaa, accc, ccc\ltimes, bcb\ltimes, cc \ltimes \ltimes, cb \ltimes \ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abab
2. ba
3. acabacbab
4. caaab

Solution
ε

Exercise 393.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes \rtimes a\ltimes, \rtimes bbb, \rtimes a \ltimes$

$\ltimes, aaab, bbaa, baaa, aabb, abbb, bbba, bbbb, bbb\ltimes, bb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abbaaabbb
2. baaabbaabab
3. b
4. bba

Solution
ε

Exercise 394.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes aa, \rtimes ab, bab, aab, aba, abb, baa, bba, ba\ltimes, ab\ltimes, b \ltimes \ltimes, a \ltimes \ltimes\}$

1. a
2. abb
3. aabbbab
4. bbaaaabbab

Solution
ε

Exercise 395.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes d, da, dc, cd, ac, dd, c\ltimes\}$

1. db
2. a
3. dabb
4. ac

Solution
ε

Exercise 396.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ad, \rtimes ada, \rtimes ade, adee, deed, eedb, edbd, ada\ltimes, dbd\ltimes, da \ltimes \ltimes, bd \ltimes \ltimes, a \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. cdb

2. badbd
3. cc
4. ddcdeb

Solution
ε

Exercise 397.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ab, eb, ba, bc, de, dd, cc, c\ltimes\}$

1. ε
2. ddddcd
3. baadcda
4. eeecbba

Solution
ε

Exercise 398.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bb, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes aab, \rtimes bb\ltimes, \rtimes \ltimes \ltimes\ltimes, baaa, aaba, baba, aaab, aabb, aaaa, bbab, abaa, abba, aba\ltimes, ba \ltimes \ltimes, bb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. ab
2. baabbbbb
3. abaaa
4. ababba

Solution
ε

Exercise 399.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes cb, \rtimes \rtimes \ltimes\ltimes, \rtimes cba, \rtimes \ltimes \ltimes\ltimes, baba, acab, cbab, baca, abac, cabb, abb\ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. acacac
2. aaacbabab

3. bbb
4. accaa

Solution
ε

Exercise 400.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes bc, \rtimes a \ltimes, add, acd, cba, cdc, dda, dca, bcb, bad, dac, ca \ltimes, a \ltimes \ltimes\}$

1. bb
2. bbdcacdbbbb
3. dccaac
4. ε

Solution
ε

Exercises with n-gram grammars

Exercise 401.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes ac, bab, bda, cdd, ddb, dba, acd, bbd, abb, da \ltimes, a \ltimes \ltimes\}$

1. cdbbca
2. a
3. aa
4. accbabdba

Solution

Exercise 402.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes cc, \rtimes a \ltimes, \rtimes \ltimes \ltimes, bca, abc, caa, cca, cab, aaa, cc \ltimes, aa \ltimes, a \ltimes \ltimes, c \ltimes \ltimes\}$

1. c
2. b
3. bcaa

4. cabcb

Solution

Exercise 403.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ab, \rtimes \rtimes a\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes aba, \rtimes a \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, babb, abba, abab, bbab, abbb, bbb\ltimes, bb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abaabba
2. bbaaabb
3. ba
4. bababbb

Solution

Exercise 404.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes ce, \rtimes cea, cead, acab, adbd, dbda, eadb, bdac, daca, cab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. ebdbbbd
2. cad
3. bbe
4. deedc

Solution

Exercise 405.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bba, aaa, bbb, baa, aba, abb\}$

1. baa
2. bbbb
3. babbbba
4. aabab

Solution

Exercise 406.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes bb, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes aaa, \rtimes bba, \rtimes \ltimes \ltimes\ltimes, abbb, aaab, aaaa, bbba, aabb, bba\ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. bbabbb
2. abbabbbb
3. abbbaab
4. a

Solution

Exercise 407.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes cb, \rtimes cbc, cbab, cbcb, bcba, bab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. ca
2. ababcc
3. bb
4. c

Solution

Exercise 408.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes bb, \rtimes \rtimes ab, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes aaa, \rtimes bbb, \rtimes ab\ltimes, \rtimes \ltimes \ltimes\ltimes, bbbb, bbba, bbaa, baaa, aaaa, aaa\ltimes, ab \ltimes \ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bbaaaa
2. bbbbabaab
3. bbbb
4. bb

Solution

Exercise 409.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes \rtimes b, \rtimes \rtimes c, \rtimes cc, \rtimes bc, bcb, aca, cad, cba, bac, cc\ltimes, ad\ltimes, c \ltimes \ltimes, d \ltimes \ltimes\}$

1. a
2. bcacaa
3. ccdaac
4. cdadbb

Solution

Exercise 410.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes ac, caa, aca, cad, cac, aaa, dca, aac, adc, ac\ltimes, c \ltimes \ltimes\}$

1. dbaaadcdaac
2. cdddbbba
3. ε
4. bbcdc

Solution

Exercise 411.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes d, \rtimes da, \rtimes dd, cbd, acc, bab, dab, bda, aba, ccb, dac, ab\ltimes, dd\ltimes, b\ltimes\ltimes, d\ltimes \ltimes\}$

1. aaddcd
2. ε
3. cbdcd
4. dc

Solution

Exercise 412.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes cb, \rtimes \rtimes \ltimes\ltimes, \rtimes cbd, \rtimes \ltimes \ltimes\ltimes, bddb, cbdd, ddbc, dbc\ltimes, bc \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. bcdda
2. aa
3. b

4. dcca

Solution

Exercise 413.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ea, \rtimes \rtimes ab, \rtimes \rtimes d\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes abe, \rtimes ea\ltimes, \rtimes d \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, abeb, aada, aeaa, eaaa, beba, baea, ebae, aaad, ada\ltimes, da \ltimes \ltimes, ea \ltimes \ltimes, d \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. bdedde
2. ada
3. dccbbcaebae
4. daabcddbb

Solution

Exercise 414.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes \ltimes \ltimes, bba, bab, aaa, aba, baa, aa\ltimes, a \ltimes \ltimes\}$

1. babbbb
2. ba
3. bbabbbaba
4. bbbabaaab

Solution

Exercise 415.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ad, \rtimes \rtimes \ltimes\ltimes, \rtimes adb, \rtimes \ltimes \ltimes\ltimes, abac, daba, adbd, dbda, bdab, bacc, acc\ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. cdaac
2. daccbcbcb
3. ccd
4. daabaacd

Solution

Exercise 416.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes d, \rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes cd, \rtimes\rtimes db, \rtimes\rtimes d\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes cdc, \rtimes db\ltimes, \rtimes d\ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, cdbd, bddc, cdbc, dcdb, cdcd, dbdd, ddcd, dbcc, bcc\ltimes, db \ltimes \ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. dbdcdcc
2. bbdcabcccdcc
3. abddbbd
4. dcdda

Solution

Exercise 417.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes da, \rtimes \ltimes \ltimes, aab, bca, cbc, daa, caa, bbc, bbb, abb, bcb, bb\ltimes, aa\ltimes, b \ltimes \ltimes, a \ltimes \ltimes\}$

1. abdda
2. ddcbdc
3. cdccadcca
4. cbac

Solution

Exercise 418.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes\ltimes, ca, cb, ab, da, ad, dd, bb, bd, dc, b\ltimes\}$

1. addcbcbda
2. caddacabcb
3. cbbd
4. babbc

Solution

Exercise 419.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes \ltimes \ltimes, bba, bab, aab, bbb, aba, abb, ba\ltimes, a \ltimes \ltimes\}$

1. bbababbb
2. abaabbbbba
3. babababa
4. aaabbabbaa

Solution

Exercise 420.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, bc, ca, ea, eb, ce, ac, a\ltimes\}$

1. cbac
2. ceacba
3. bcdacdb
4. b

Solution

Exercise 421.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes aa, \rtimes aaa, aacb, acba, cbab, aaac, baac, babb, abba, bbaa, aac\ltimes, ac\ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. ε
2. cbcaca
3. abcacaa
4. c

Solution

Exercise 422.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ae, \rtimes \ltimes \ltimes, cbd, bcb, bda, ebc, aeb, da\ltimes, a \ltimes \ltimes\}$

1. d
2. aaaccd
3. ceacd
4. ddbcc

Solution

Exercise 423.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, cc, bc, ba, ca, cb, ab, aa, ac, c\ltimes\}$

1. ε
2. bcaacacac
3. abccba
4. ababab

Solution

Exercise 424.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes e, \rtimes\rtimes\rtimes a, \rtimes\rtimes ed, \rtimes\rtimes aa, \rtimes aab, \rtimes edd, eddc, dcab, ddca, cab\ltimes, aab\ltimes, ab\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. cbda
2. eaada
3. ee
4. ε

Solution

Exercise 425.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes b, \rtimes\rtimes aa, \rtimes\rtimes cd, \rtimes\rtimes b\ltimes, \rtimes aac, \rtimes cdb, \rtimes b\ltimes\ltimes, cabd, acab, abdd, bddd, aaca, ddda, cdb\ltimes, dda\ltimes, db\ltimes\ltimes, da\ltimes\ltimes, a\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. cbcbcd
2. bccbd
3. abadbb
4. bdcacdbd

Solution

Exercise 426.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes c, \rtimes\rtimes a, \rtimes bb, \rtimes cb, \rtimes a\ltimes, bba, bab, bca, abc, caa, cac, aca, aa\ltimes, cb\ltimes, a\ltimes \ltimes, b \ltimes \ltimes\}$

1. aab
2. cccabbab
3. bbcbacbca
4. bbbcbcaa

Solution

Exercise 427.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, ba, ab, bb, aa, a\ltimes\}$

1. bbabaa
2. bbbb
3. abaab
4. baabb

Solution

Exercise 428.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, cc, bc, ca, ab, da, cd, db, ad, ac, b\ltimes\}$

1. cbab
2. addbcadbdc
3. aacdb
4. ccbb

Solution

Exercise 429.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes ab, \rtimes ac, bab, acb, bcb, abc, aca, cac, cba, ab\ltimes, ba\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. aacbabaaab

2. bccaccbcaa
3. bc
4. bbaabccca

Solution

Exercise 430.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes ba, \rtimes aa, \rtimes b\ltimes, bba, bab, aab, bbb, baa, abb, ab\ltimes, aa\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. aba
2. abaabbabb
3. bba
4. aaabaab

Solution

Exercise 431.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes cc, \rtimes \rtimes ca, \rtimes \rtimes a\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes caa, \rtimes ccc, \rtimes a\ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, ccba, cccb, cbac, cccc, bac\ltimes, caa\ltimes, ac \ltimes \ltimes, aa \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. cbbbc
2. caccbcc
3. c
4. ba

Solution

Exercise 432.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ae, ca, da, db, ad, ed, eb, be, b\ltimes\}$

1. dacbbb
2. ecdebd
3. aeaead
4. bec

Solution

Exercise 433.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes aa, \rtimes aaa, \rtimes aa\ltimes, baaa, abaa, aaba, aaab, aaaa, aaa\ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. bb
2. baaabbbba
3. abbaaaaaba
4. bba

Solution

Exercise 434.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bb, \rtimes \rtimes \ltimes\ltimes, \rtimes bbb, \rtimes \ltimes \ltimes\ltimes, bbcd, addb, cdad, bbbc, bcda, ddbb, dbbd, dadd, bbdb, bdb\ltimes, db \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. cbbdcdaabad
2. ddaabcbcabaa
3. aa
4. adcccbbdbdda

Solution

Exercise 435.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ad, \rtimes b\ltimes, \rtimes \ltimes \ltimes, dad, eab, bce, cea, aea, ada, abc, dae, ad\ltimes, ea\ltimes, b \ltimes \ltimes, d \ltimes \ltimes, a \ltimes \ltimes\}$

1. acecbccca
2. eaebda
3. cbbedebeca
4. decadda

Solution

Exercise 436.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes bbc, bcca, ccac, bbcc, cacb, acbc, cbc\ltimes, bc \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. c
2. bbacaabc
3. cccabcc
4. ccacb

Solution

Exercise 437.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes b, \rtimes \rtimes bd, \rtimes \rtimes ca, \rtimes \rtimes da, \rtimes dab, \rtimes cad, \rtimes bd\ltimes, adac, dcad, cada, cadb, acdc, cdca, dacd, dab\ltimes, adb\ltimes, db\ltimes \ltimes, bd \ltimes \ltimes, ab \ltimes \ltimes, d \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bddccbcdc
2. dc
3. cabbcbcd
4. bdaabcccbd

Solution

Exercise 438.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cc, ba, cb, cd, da, dd, bb, dc\}$

1. cddbbacbcd
2. dc
3. baadbbccbbcb
4. cdcaaaca

Solution

Exercise 439.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ab, \rtimes dd, \rtimes \ltimes \ltimes, bca, abc, caa, dad, aac, acd, cda, dac, ad\ltimes, dd\ltimes, d \ltimes \ltimes\}$

1. edaaadadeaea
2. ea

3. eebabcdc
4. acbaddaccccb

Solution

Exercise 440.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes eb, bde, cba, dec, ebd, ecb, ba\ltimes, a \ltimes \ltimes\}$

1. ε
2. b
3. cdc
4. cdccd

Solution

Exercise 441.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes c, \rtimes\ltimes, ae, ea, cd, ec, db, ed, be, c\ltimes, d\ltimes\}$

1. dbebad
2. edcde
3. cbe
4. bebd

Solution

Exercise 442.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ca, \rtimes \ltimes \ltimes, caa, aca, cac, aac, ac\ltimes, c \ltimes \ltimes\}$

1. c
2. cbaacc
3. bacc
4. ccb

Solution

Exercise 443.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cc, bc, ba, ca, cb, ab, aa, ac\}$

1. accab
2. ccbabbabbaa
3. aacbcaca
4. abbbcaac

Solution

Exercise 444.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, de, ae, ca, ec, ed, d\ltimes\}$

1. caebd
2. ε
3. c
4. bccddbed

Solution

Exercise 445.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cc, \rtimes c\ltimes, ceb, ebc, eea, bce, cee, cce, ea\ltimes, a \ltimes \ltimes, c \ltimes \ltimes\}$

1. dee
2. bd
3. cba
4. dd

Solution

Exercise 446.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes ed, \rtimes edd, ddda, ddac, eddd, dac\ltimes, ac \ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. dbbad
2. dcea

3. d
4. cc

Solution

Exercise 447.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes b, \rtimes \rtimes bd, \rtimes \rtimes cd, \rtimes \rtimes c\ltimes, \rtimes cda, \rtimes bdb, \rtimes c \ltimes \ltimes, cdab, abaa, bcda, baaa, bdbb, bbcd, daba, dbbc, aaa\ltimes, cda\ltimes, da \ltimes \ltimes, aa \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. dabdbdab
2. cbbbbdadda
3. da
4. bbcaaccdd

Solution

Exercise 448.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, cc, ba, ca, ea, cd, ab, be, ce, ac, dc, e\ltimes\}$

1. eceaccbe
2. bcc
3. dbeadcabce
4. babaeceadbe

Solution

Exercise 449.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, cd, db, bb, ac, bd, d\ltimes\}$

1. adaa
2. eacebb
3. cecc
4. bcecc

Solution

Exercise 450.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes e, \rtimes \rtimes c, \rtimes ce, \rtimes dc, \rtimes e\ltimes, aee, dcd, cdd, dda, dae, ee\ltimes, ce\ltimes, e \ltimes \ltimes\}$

1. bcda
2. aaadd
3. eebead
4. ccac

Solution

Exercise 451.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes c, \rtimes ca, \rtimes d\ltimes, ddc, dcd, cdd, cac, acd, cd\ltimes, d \ltimes \ltimes\}$

1. addb
2. baca
3. c
4. ca

Solution

Exercise 452.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes ba, ada, dab, bad, aba, ba\ltimes, a \ltimes \ltimes\}$

1. b
2. eedaae
3. ed
4. ebdcd

Solution

Exercise 453.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes \rtimes \ltimes, \rtimes eb, \rtimes \ltimes \ltimes, bba, bab, abd, ecc, bde, ede, ebb, dec, ded, cc\ltimes, c \ltimes \ltimes\}$

1. eaabdb

2. becdedecbe
3. cacececeaad
4. ce

Solution

Exercise 454.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes ed, aed, cae, dca, edc, ed\ltimes, d \ltimes \ltimes\}$

1. ε
2. babcaa
3. aca
4. ecdc

Solution

Exercise 455.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, cc, ca, cd, ad, dd, ac, dc, d\ltimes\}$

1. babcbaddd
2. dbbdbadcb
3. abadaaab
4. dddcbadca

Solution

Exercise 456.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, bc, cc, ca, cd, ac, d\ltimes\}$

1. d
2. dcddaba
3. bdcbbb
4. daba

Solution

Exercise 457.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\!\ltimes, ba, ab, bb, aa, a\ltimes\}$

1. bbb
2. abbaab
3. b
4. aa

Solution

Exercise 458.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes\!\ltimes, ca, ea, ab, ec, eb, bb, be, a\ltimes\}$

1. cedcacaa
2. eaebeecdd
3. eaebaad
4. c

Solution

Exercise 459.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes e, \rtimes\rtimes ec, \rtimes\rtimes ea, \rtimes eae, \rtimes ec\ltimes, aebb, eaeb, dceb, ceba, ebad, ebbd, bdce, bbdc, bad\ltimes, ec\ltimes\ltimes, ad\ltimes\ltimes, c\ltimes\ltimes\ltimes, d\ltimes\ltimes\ltimes\}$

1. eadaa
2. ebbbdbdcbeb
3. cecabbec
4. ε

Solution

Exercise 460.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\ \rtimes\ \rtimes b, \rtimes\ \rtimes\ \rtimes e, \rtimes\ \rtimes\ ed, \rtimes\ \rtimes\ ec, \rtimes\ \rtimes\ b\ltimes, \rtimes ede, \rtimes eca, \rtimes b\ \ltimes\ltimes, deed, edee, edab, eeda, dabc, abcb, bcb\ltimes, eca\ltimes, cb\ltimes\ltimes, ca\ltimes\ltimes, a\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. d
2. ε
3. aa
4. bccdd

Solution

Exercise 461.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes d, \rtimes\rtimes de, \rtimes dee, dddb, eedd, ddba, deed, dddd, babc, dbab, eddd, abc\ltimes, bc\ltimes \ltimes, c \ltimes \ltimes\ltimes\}$

1. cbadcbb
2. dbbebdbad
3. edbaeadeaece
4. dacabb

Solution

Exercise 462.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ac, \rtimes aca, cabb, bcbc, acab, bcca, abbc, bbcb, cbcc, cca\ltimes, ca \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. ε
2. aaacbaacb
3. ccccbb
4. bb

Solution

Exercise 463.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes e, \rtimes \rtimes bc, \rtimes \rtimes ea, \rtimes \rtimes d\ltimes, \rtimes eac, \rtimes bcc, \rtimes d \ltimes \ltimes, dbcb, ddbc, acdd, eacd, cddb, bcba, cba\ltimes, bcc\ltimes, ba \ltimes \ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. dd
2. ddec
3. dbb

4. ε

Solution

Exercise 464.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes cc, \rtimes \ltimes \ltimes, bba, cbb, aca, ccb, bbb, bac, ca\ltimes, ba\ltimes, a \ltimes \ltimes\}$

1. bc
2. acb
3. c
4. cbbcc

Solution

Exercise 465.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ae, \rtimes \ltimes \ltimes, aee, cbe, eed, dcb, edc, be\ltimes, e \ltimes \ltimes\}$

1. dada
2. bcbbce
3. ceabc
4. db

Solution

Exercise 466.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes \ltimes \ltimes, bba, abc, cab, aab, aca, bac, abb, bc\ltimes, c \ltimes \ltimes\}$

1. abb
2. bcacaacc
3. ac
4. ccb

Solution

Exercise 467.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes cb, \rtimes cba, cbad, ceab, dcea, badc, adce, eab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. e
2. debb
3. dba
4. ε

Solution

Exercise 468.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes bc, \rtimes \rtimes ab, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes aba, \rtimes bcb, \rtimes aa\ltimes, \rtimes \ltimes\ltimes, cbba, bbcb, bcbb, cbbc, bbab, cbcb, bcbc, bab\ltimes, aba\ltimes, ba \ltimes \ltimes, ab \ltimes \ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bacacccbac
2. ab
3. aaabab
4. abbcc

Solution

Exercise 469.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes bd, \rtimes \rtimes dd, \rtimes \rtimes ad, \rtimes \rtimes d\ltimes, \rtimes bdc, \rtimes ddd, \rtimes ad\ltimes, \rtimes d \ltimes \ltimes, cdad, dddc, ddcd, dcda, dad\ltimes, bdc\ltimes, dc \ltimes \ltimes, ad \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. dbc
2. baa
3. ddbd
4. bcacb

Solution

Exercise 470.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ca, cd, da, dd, aa, ac, dc, a\ltimes\}$

1. cbacdadb
2. dabbdddc
3. bacaddbda
4. dccbccdb

Solution

Exercise 471.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes aa, \rtimes\rtimes a\ltimes, \rtimes aaa, \rtimes a\ltimes\ltimes, aaab, abbc, aabb, bbc\ltimes, bc\ltimes\ltimes, c\ltimes\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. ccaacb
2. abc
3. bb
4. caccb

Solution

Exercise 472.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes d, \rtimes\rtimes c, \rtimes ce, \rtimes de, ced, dea, eae, ebc, aeb, bce, aea, ed\ltimes, ce\ltimes, e\ltimes\ltimes, d\ltimes\ltimes\}$

1. a
2. eea
3. eddcd
4. ε

Solution

Exercise 473.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes d, \rtimes da, \rtimes db, bba, ecd, dab, bee, cdb, eec, dbb, bbb, abe, ba\ltimes, db\ltimes, a\ltimes\ltimes, b\ltimes\ltimes\}$

1. bbeadbaacd
2. abcabbbcc
3. acdeecd
4. daebb

Solution

Exercise 474.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes bc, \rtimes \rtimes cc, \rtimes \rtimes a\ltimes, \rtimes bcb, \rtimes cc\ltimes, \rtimes a \ltimes \ltimes, baca, acaa, cbac, caaa, bcba, aaa\ltimes, cc \ltimes \ltimes, aa \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. abaaacb
2. aaabbaaa
3. bbbacaab
4. aacc

Solution

Exercise 475.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cb, aee, cbc, cae, cec, eca, bce, ee\ltimes, e \ltimes \ltimes\}$

1. dadb
2. dbdcdcc
3. cdacee
4. eddeeabc

Solution

Exercise 476.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bc, ca, ba, cb, ab, bb, aa, ac\}$

1. ca
2. cac
3. cabaa
4. aabbbcab

Solution

Exercise 477.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aba, bba, aaa, aab\}$

1. aaaaaaaa
2. abbabb
3. babaa
4. aababaa

Solution

Exercise 478.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes b, ba, ea, ab, ad, ce, aa, dc, d\ltimes, b\ltimes\}$

1. cb
2. accbab
3. aadaa
4. ε

Solution

Exercise 479.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes ed, daa, acc, cbb, aac, ccb, eda, bb\ltimes, b \ltimes \ltimes\}$

1. ccc
2. eaabcbcd
3. bdcbc
4. cddce

Solution

Exercise 480.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes \ltimes \ltimes, bab, acb, bcc, cba, bbc, aac, bbb, abb, cc\ltimes, c \ltimes \ltimes\}$

1. acb
2. bbb

3. bcbac
4. aacc

Solution

Exercise 481.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bba, bab, aab, aaa, aba, bbb, baa, abb\}$

1. bababaa
2. babbb
3. abbbbaa
4. aaa

Solution

Exercise 482.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes b, \rtimes\ltimes, bc, ca, ab, bb, aa, d\ltimes, b\ltimes\}$

1. cadcda
2. daed
3. bcaabd
4. aecaedb

Solution

Exercise 483.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes \rtimes ec, \rtimes \rtimes d\ltimes, \rtimes ecc, \rtimes bb\ltimes, \rtimes d \ltimes \ltimes, ecdd, cecd, ccec, ecce, cdd\ltimes, bb \ltimes \ltimes, dd \ltimes \ltimes, d \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. a
2. baaecc
3. ac
4. ε

Solution

Exercise 484.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes d, bc, ca, cb, ad, bb, dc, d\ltimes, b\ltimes\}$

1. acb
2. bcbcab
3. dbbbbaa
4. c

Solution

Exercise 485.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes d, \rtimes\rtimes\rtimes e, \rtimes\rtimes dd, \rtimes\rtimes eb, \rtimes eba, \rtimes dd\ltimes, adca, ebad, badc, dcad, cad\ltimes, ad\ltimes \ltimes, dd \ltimes \ltimes, d \ltimes \ltimes\ltimes\}$

1. adbdacb
2. eaa
3. daa
4. eb

Solution

Exercise 486.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes a, \rtimes ad, \rtimes d\ltimes, ada, abd, dab, bde, dec, ec\ltimes, c \ltimes \ltimes, d \ltimes \ltimes\}$

1. b
2. ε
3. beabcca
4. eda

Solution

Exercise 487.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bab, aab, aaa, bbb, baa, aba, abb\}$

1. bbbababba

2. bbbabb
3. aaaabbaaba
4. abbbabbaaa

Solution

Exercise 488.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\ \rtimes\ \rtimes a, \rtimes\ \rtimes\ \rtimes\ltimes, \rtimes\ \rtimes\ ab, \rtimes\ \rtimes\ aa, \rtimes\ \rtimes\ \ltimes\ltimes, \rtimes aaa, \rtimes abb, \rtimes\ \ltimes\ltimes, abba, aabb, bbaa, baaa, aaaa, aaab, aaa\ltimes, abb\ltimes, aa\ \ltimes\ \ltimes, bb\ \ltimes\ \ltimes, a\ \ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. babbabaa
2. aabbaaa
3. babaaab
4. abaaaabaa

Solution

Exercise 489.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bc, cc, ba, cb, da, ad\}$

1. dcabad
2. bcbcbdc
3. ccabbdbbcaa
4. bbdbddbadc

Solution

Exercise 490.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes d, \rtimes\ltimes, cc, ba, cb, ab, bd, d\ltimes\}$

1. ddcdbd
2. ccdcc
3. cc
4. abacc

Solution

Exercise 491.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes\ltimes, de, ae, ca, db, ed, ac, ee, bd, d\ltimes\}$

1. dedbbdbe
2. debdaedbec
3. daebb
4. cdbeead

Solution

Exercise 492.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes\ltimes, cc, cb, ec, db, dd, bd, d\ltimes, e\ltimes\}$

1. eaeaae
2. dbad
3. dd
4. cedec

Solution

Exercise 493.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ba, \rtimes \rtimes \ltimes\ltimes, \rtimes bab, \rtimes \ltimes \ltimes\ltimes, babb, abbb, bbba, bba\ltimes, ba \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. bbbaaa
2. bbabab
3. bab
4. aaa

Solution

Exercise 494.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ab, \rtimes abc, cabb, bcab, bbea, abbe, beae, abca, eae\ltimes, ae \ltimes \ltimes, e \ltimes \ltimes\ltimes\}$

1. ade
2. eccbbbbeb
3. abccbddaa
4. aadbdecdc

Solution

Exercise 495.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ba, \rtimes \rtimes\ltimes\ltimes, baaa, abaa, aaba, aaab, aaaa, aaa\ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. aaabaa
2. bbaaabbab
3. aaab
4. ab

Solution

Exercise 496.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes b, \rtimes\rtimes ba, \rtimes\rtimes aa, \rtimes aab, \rtimes ba\ltimes, abbb, babb, bbab, bbba, aabb, abb\ltimes, ba\ltimes \ltimes, bb \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. babbbab
2. ε
3. aaa
4. baaba

Solution

Exercise 497.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes ba, \rtimes\rtimes ab, \rtimes\rtimes a\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes bab, \rtimes abb, \rtimes a\ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, baab, aaba, bbba, bbaa, abbb, bab\ltimes, aba\ltimes, ba \ltimes \ltimes, ab \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abbbbbb
2. aabbaabb
3. aaaaaa

4. bbbbaabb

Solution

Exercise 498.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes ba, \rtimes \rtimes ab, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes aaa, \rtimes baa, \rtimes ab\ltimes, \rtimes \ltimes \ltimes\ltimes, abaa, aaba, baaa, aaaa, aaab, aba\ltimes, baa\ltimes, ba \ltimes \ltimes, ab \ltimes \ltimes, aa \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. abaababaaaaa
2. abaaaaaab
3. a
4. abababababaab

Solution

Exercise 499.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes c, cc, ae, ca, cd, ec, aa, d\ltimes, e\ltimes\}$

1. ecdb
2. ε
3. dbbbaa
4. ebdcbb

Solution

Exercise 500.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes \ltimes \ltimes, bdc, dcd, cdd, bbd, dd\ltimes, d \ltimes \ltimes\}$

1. cdabd
2. cce
3. abeb
4. bd

Solution

Exercise 501.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, bb, ac, ba, ab, cb, c\ltimes\}$

1. cbbbcb
2. bacbabcbccb
3. acbcbc
4. aabcb

Solution

Exercise 502.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes a, \rtimes cc, \rtimes ac, cbb, acb, ccc, bbc, bcc, cc\ltimes, c \ltimes \ltimes\}$

1. bcacb
2. aaccba
3. abaca
4. ε

Solution

Exercise 503.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes ba, \rtimes \rtimes b\ltimes, \rtimes \rtimes \ltimes\ltimes, \rtimes bab, \rtimes b \ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, bbcb, baba, abbc, abab, babb, bcb\ltimes, cb \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. baba
2. ababcbb
3. aca
4. babacacc

Solution

Exercise 504.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes da, \rtimes dab, bcce, ceca, dabc, ccec, abcc, ecab, cab\ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. e
2. acddedea
3. ceecdebed
4. ccbcbc

Solution

Exercise 505.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, bb, bd, db, dc, dd, bc, cd, cb, cc, d\ltimes\}$

1. addccbd
2. ε
3. cccbccaaac
4. bbacaadb

Solution

Exercise 506.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes aa, \rtimes ab, \rtimes b\ltimes, abb, aaa, aab, bbb, bba, bab, ab\ltimes, b \ltimes \ltimes\}$

1. aaabbaab
2. a
3. aababaaba
4. bba

Solution

Exercise 507.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ca, bb, ac, ba, ab, aa, a\ltimes\}$

1. accabbacca
2. bbabbcbbbb
3. aaba
4. caabaabb

Solution

Exercise 508.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes a, \rtimes\rtimes ac, \rtimes\rtimes cc, \rtimes ccb, \rtimes acc, dcac, cacd, bcda, ddca, addc, ccbc, dadd, cbcd, cdad, acd\ltimes$
$\ltimes, cd \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. ε
2. abc
3. babcbcbb
4. acd

Solution

Exercise 509.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes \ltimes, \rtimes de, \rtimes \ltimes \ltimes, eee, aaa, dee, eaa, eea, aa\ltimes, a \ltimes \ltimes\}$

1. c
2. b
3. bda
4. cd

Solution

Exercise 510.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, \rtimes\ltimes, ba, ab, b\ltimes\}$

1. bababb
2. baab
3. baaa
4. abaa

Solution

Exercise 511.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes b, \rtimes cc, \rtimes b\ltimes, abb, aab, aba, bca, cca, bbc, caa, ba\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. cbababb

2. bcaaccbab
3. cb
4. acbbacbacc

Solution

Exercise 512.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes a, \rtimes ac, cac, dcc, acb, ccc, cca, cbc, acd, bcc, ccb, cdc, cb\ltimes, ac\ltimes, c\ltimes\ltimes, b\ltimes\ltimes\}$

1. adada
2. bab
3. c
4. addaabcaab

Solution

Exercise 513.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ca, ba, ab, bc, cc, a\ltimes\}$

1. aaa
2. a
3. ε
4. bcabaacb

Solution

Exercise 514.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes bb, \rtimes\rtimes cb, \rtimes\rtimes b\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes bbc, \rtimes cbb, \rtimes b\ltimes\ltimes, \rtimes\ltimes\ltimes\ltimes, caad, aadc, bbca, adcc, ccbd, dccb, bcaa, cbd\ltimes, cbb\ltimes, bd\ltimes\ltimes, bb\ltimes\ltimes, d\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. baadccaac
2. daccbda
3. cccc
4. c

Solution

Exercise 515.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\ \rtimes\ \rtimes c, \rtimes\ \rtimes\ \rtimes a, \rtimes\ \rtimes\ cd, \rtimes\ \rtimes\ ab, \rtimes\ \rtimes\ c\ltimes, \rtimes cdb, \rtimes ab\ltimes, \rtimes c\ \ltimes\ltimes, baba, badb, cdba, dbab, abad, adb\ltimes, db\ltimes\ltimes, ab\ltimes\ltimes, b\ltimes\ltimes\ltimes, c\ltimes\ltimes\ltimes\}$

1. bdbada
2. bcabcb
3. acaad
4. cbbcacd

Solution

Exercise 516.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes\ltimes, \rtimes ba, \rtimes bb, \rtimes\ltimes\ltimes, cbe, deb, bab, bde, abd, ebc, bcb, bb\ltimes, be\ltimes, e\ltimes\ltimes, b\ltimes\ltimes\}$

1. b
2. cdd
3. aabdeaee
4. ebccbbb

Solution

Exercise 517.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\ltimes, ca, bd, ba, ab, dc, bc, ad, db, cd, b\ltimes\}$

1. caabb
2. cc
3. cdadb
4. dcca

Solution

Exercise 518.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\ltimes, bb, ba, ab, b\ltimes\}$

1. ba
2. aaab
3. bbbaaab
4. aaaa

Solution

Exercise 519.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes aa, \rtimes bc, \rtimes b\ltimes, abb, baa, aab, bcb, bbc, cba, ab\ltimes, bc\ltimes, c \ltimes \ltimes, b \ltimes \ltimes\}$

1. bb
2. c
3. cbabcbc
4. baaccb

Solution

Exercise 520.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cc, abb, cab, abc, aab, ccc, cca, bcc, caa, bb\ltimes, b \ltimes \ltimes\}$

1. a
2. cbacacbcaba
3. abbccb
4. bcbaaabca

Solution

Exercise 521.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\ltimes, be, bb, bd, ba, ab, aa, ec, db, cc, c\ltimes\}$

1. cdd
2. eaecae
3. daac
4. eaebebcbe

Solution

Exercise 522.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \ \rtimes \ \rtimes e, \rtimes \ \rtimes \ \rtimes c, \rtimes \ \rtimes \ \rtimes \ltimes, \rtimes \ \rtimes \ ec, \rtimes \ \rtimes \ cc, \rtimes \ \rtimes \ cd, \rtimes \ \rtimes \ e \ltimes, \rtimes \ \rtimes \ \ltimes \ltimes, \rtimes ecb, \rtimes cca, \rtimes cd \ltimes, \rtimes e \ltimes \ltimes, \rtimes \ltimes \ltimes \ltimes, beba, ebaa, cbeb, abcc, baab, aabc, ecbe, bccc, ccc \ltimes, cca \ltimes, ca \ltimes \ltimes, cc \ltimes \ltimes, cd \ltimes \ltimes, c \ltimes \ltimes \ltimes, e \ltimes \ltimes \ltimes, a \ltimes \ltimes \ltimes, d \ltimes \ltimes \ltimes\}$

1. cbbaebcceeb
2. dbeb
3. addeecaddba
4. ebbeca

Solution

Exercise 523.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes b, \rtimes ca, \rtimes bb, add, dba, bbd, bdb, bad, ddd, ca \ltimes, dd \ltimes, a \ltimes \ltimes, d \ltimes \ltimes\}$

1. cbcab
2. d
3. caaaabd
4. aaabdcc

Solution

Exercise 524.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes ac, cbd, bdc, cbb, acb, dcd, bbc, cdb, bcb, db \ltimes, b \ltimes \ltimes\}$

1. adaccbbc
2. abcdcbcaad
3. cbabab
4. b

Solution

Exercise 525.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes aa, \rtimes ab, \rtimes \ltimes \ltimes, abb, baa, aab, bba, bab, aba, ab \ltimes, b \ltimes \ltimes\}$

1. abbabba
2. baa
3. aa
4. abaaaaa

Solution

Exercise 526.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes e, \rtimes\rtimes b, \rtimes\rtimes\ltimes, \rtimes be, \rtimes e\ltimes, \rtimes\ltimes\ltimes, cec, ecc, bee, eec, cce, ecd, cdb, db\ltimes, e\ltimes \ltimes, b \ltimes \ltimes\}$

1. cca
2. eddccebba
3. edad
4. aebcccec

Solution

Exercise 527.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ed, ae, da, dc, ec, de, cd, c\ltimes\}$

1. aeaede
2. ε
3. aa
4. bd

Solution

Exercise 528.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes bbc, bccb, ccbc, cbcb, bbcc, bcb\ltimes, cb \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. c
2. ccc
3. ca
4. cb

Solution

Exercise 529.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes dd, \rtimes d\ltimes, dad, add, ada, ddd, dda, dd\ltimes, d \ltimes \ltimes\}$

1. ε
2. ddcd
3. dbd
4. abbbad

Solution

Exercise 530.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, ca, aa, dc, cd, cc, a\ltimes\}$

1. dbbcb
2. bcdcb
3. dcbbdd
4. aba

Solution

Exercise 531.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes b, \rtimes \rtimes bb, \rtimes \rtimes d\ltimes, \rtimes bba, \rtimes d \ltimes \ltimes, bbdb, abbd, babb, bbab, bdbc, dbc\ltimes, bc \ltimes \ltimes, d \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. acabcccc
2. cadb
3. cba
4. dca

Solution

Exercise 532.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bb, baa, bbb, aab, bba, bab, aba, ab\ltimes, b \ltimes \ltimes\}$

1. abbab

2. b
3. baabbaab
4. bb

Solution

Exercise 533.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes\ltimes, be, bb, ba, eb, ea, ad, de, dd, a\ltimes\}$

1. ec
2. accda
3. acbb
4. bcd

Solution

Exercise 534.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, ab, aa, bb\}$

1. bb
2. ba
3. bba
4. bababa

Solution

Exercise 535.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ac, aa, ea, dd, de, c\ltimes\}$

1. eadba
2. ε
3. cbd
4. cccbc

Solution

Exercise 536.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \quad \rtimes \quad \rtimes b, \rtimes \quad \rtimes \quad \rtimes c, \rtimes \quad \rtimes \quad \rtimes \ltimes, \rtimes \quad \rtimes \quad cb, \rtimes \quad \rtimes$ $bb, \rtimes \quad \rtimes \quad ba, \rtimes \quad \rtimes \quad \ltimes \ltimes, \rtimes bac, \rtimes cbc, \rtimes bb \ltimes, \rtimes \quad \ltimes$ $\ltimes \ltimes, bbaa, baaa, abaa, cbba, baab, cbcb, aaaa, bcbb, aaba, aaa \ltimes, bac \ltimes, aa \quad \ltimes$ $\ltimes, ac \ltimes \ltimes, bb \ltimes \ltimes, c \ltimes \ltimes \ltimes, a \ltimes \ltimes \ltimes, b \ltimes \ltimes \ltimes\}$

1. bbaacccbcbc
2. accbbc
3. bababacbac
4. cbbaaaaca

Solution

Exercise 537.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ca, ad, bb, ab, aa, cb, cc\}$

1. ccd
2. ddcc
3. abdbe
4. adacaeaa

Solution

Exercise 538.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cb, \rtimes c \ltimes, cac, baa, aac, cbb, bba, cca, acc, ccb, bb \ltimes, c \ltimes \ltimes, b \ltimes \ltimes\}$

1. ε
2. aabcbbccbab
3. aacca
4. bcba

Solution

Exercise 539.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes b, \rtimes\!\ltimes, ca, dc, cd, bc, cc, a\ltimes\}$

1. aaabbdc
2. cc
3. dd
4. bdb

Solution

Exercise 540.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, bb, ba, ab, b\ltimes\}$

1. cc
2. aa
3. cbccbb
4. bccb

Solution

Exercise 541.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\!\ltimes, bd, da, ab, dc, bc, db, cd, c\ltimes\}$

1. dddb
2. dc
3. bcdabadad
4. caccdbcc

Solution

Exercise 542.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes a, \rtimes\!\ltimes, bb, ba, ab, b\ltimes, a\ltimes\}$

1. bbaaaabbbab
2. ababaaaa
3. aaabbbbaaba
4. aaaa

Solution

Exercise 543.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, bb, ba, ab, aa, b\ltimes\}$

1. abba
2. baaa
3. bbbbbaa
4. babaaba

Solution

Exercise 544.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, bb, ba, ab, aa, a\ltimes\}$

1. bab
2. abababbab
3. abaaa
4. bbaababaaab

Solution

Exercise 545.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bd, cc, ba, ac, ab, aa, bc, cd\}$

1. caa
2. dabd
3. ddbddc
4. dbba

Solution

Exercise 546.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes a, \rtimes \rtimes aa, \rtimes \rtimes b\ltimes, \rtimes aaa, \rtimes b \ltimes \ltimes, aaab, babb, bbab, aabb, abbb, bbba, abb\ltimes, bb \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. abbaabb

2. ab
3. aa
4. ba

Solution

Exercise 547.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes d, \rtimes \rtimes de, \rtimes \rtimes cd, \rtimes \rtimes c\ltimes, \rtimes cdd, \rtimes ded, \rtimes c \ltimes \ltimes, ddda, eebd, ebdd, ddac, edee, dede, bddd, deeb, cdd\ltimes, dac\ltimes, ac \ltimes \ltimes, dd \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. ecadcb
2. ε
3. eeeebad
4. dbabec

Solution

Exercise 548.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes \rtimes a, \rtimes cd, \rtimes ad, baa, dcb, cdc, cba, ad\ltimes, aa\ltimes, a \ltimes \ltimes, d \ltimes \ltimes\}$

1. dedbd
2. ebda
3. ba
4. cedb

Solution

Exercise 549.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes d, \rtimes\ltimes, ee, ed, bc, ce, de, db, cc, c\ltimes\}$

1. ddd
2. cebdee
3. ceeeeebeadc
4. bcaedccadda

Solution

Exercise 550.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes da, \rtimes \rtimes ab, \rtimes \rtimes \ltimes\ltimes, \rtimes abb, \rtimes dac, \rtimes \ltimes \ltimes\ltimes, bcdc, cdcb, dcbc, cbcc, bccd, abbc, bbcd, ccd\ltimes, dac\ltimes, ac \ltimes \ltimes, cd \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. acadcc
2. dbadccadb
3. bbda
4. bbcad

Solution

Exercise 551.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes ac, \rtimes ace, ceae, acea, eaed, aedb, edb\ltimes, db \ltimes \ltimes, b \ltimes \ltimes\ltimes\}$

1. cd
2. ε
3. ea
4. bdcaaac

Solution

Exercise 552.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes d, \rtimes\rtimes\ltimes, \rtimes db, \rtimes\ltimes\ltimes, baa, dba, aad, bad, ddb, bdd, dbd, aba, ada, dab, ad\ltimes, d\ltimes \ltimes\}$

1. abb
2. d
3. aacebcabeb
4. c

Solution

Exercise 553.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes aa, \rtimes bb, abb, aba, bba, bab, aa\ltimes, ba\ltimes, a \ltimes \ltimes\}$

1. ε
2. aab
3. baaaaaa
4. ab

Solution

Exercise 554.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes c, \rtimes\rtimes\ltimes, \rtimes cc, \rtimes\ltimes\ltimes, cbd, eee, beb, bdb, dee, dbe, ebd, bde, ccb, eeb, eb\ltimes, b\ltimes\ltimes\}$

1. aecee
2. dcbbc
3. cadbbbbdadb
4. bbaeabacea

Solution

Exercise 555.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\ \rtimes\ \rtimes d, \rtimes\ \rtimes\ \rtimes\ltimes, \rtimes\ \rtimes\ db, \rtimes\ \rtimes\ \ltimes\ltimes, \rtimes dbb, \rtimes\ \ltimes\ltimes\ltimes, dbba, bdbb, bbdb, dbbd, bba\ltimes, ba\ltimes\ltimes, a\ltimes\ltimes\ltimes\}$

1. aa
2. eeba
3. ecc
4. bd

Solution

Exercise 556.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes a, \rtimes\rtimes\ltimes, \rtimes ac, \rtimes\ltimes\ltimes, daa, aaa, cbb, aac, acb, acc, ccd, cda, bb\ltimes, b\ltimes\ltimes\}$

1. aeaacae
2. cececbbb
3. abeacdbe
4. aadbeaaed

Solution

Exercise 557.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes a, \rtimes\rtimes ba, \rtimes\rtimes ab, \rtimes bab, \rtimes abd, ddda, bddd, dddd, ddad, abdd, bab\ltimes, dad\ltimes, ad\ltimes \ltimes, ab \ltimes \ltimes, b \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. abcd
2. e
3. cdad
4. dad

Solution

Exercise 558.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes ba, \rtimes ad, bae, dba, dec, adb, cde, ecd, ede, aed, ba\ltimes, de\ltimes, e \ltimes \ltimes, a \ltimes \ltimes\}$

1. ε
2. edacdbea
3. ead
4. ded

Solution

Exercise 559.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes b\ltimes, \rtimes \ltimes \ltimes, abb, bbb, bba, bab, ba\ltimes, bb\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. ababbab
2. bbaaaa
3. abbabbbb
4. abbabbb

Solution

Exercise 560.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes d, \rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes aa, \rtimes d\ltimes, \rtimes \ltimes$

$\ltimes, bdc, abd, cab, aad, dca, adc, dc\ltimes, ba\ltimes, c \ltimes \ltimes, d \ltimes \ltimes, a \ltimes \ltimes\}$

1. babdba
2. bdabddd
3. bab
4. accb

Solution

Exercise 561.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, ca, ac, da, aa, cb, bc, ad, cc, c\ltimes\}$

1. cada
2. babd
3. dccbdca
4. a

Solution

Exercise 562.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes d, \rtimes \rtimes \ltimes, \rtimes ba, \rtimes db, \rtimes b\ltimes, \rtimes \ltimes \ltimes, bab, aca, bdc, cac, abd, cae, dca, aee, ee\ltimes, db\ltimes, e \ltimes \ltimes, b \ltimes \ltimes\}$

1. edb
2. addcc
3. dcaeadcc
4. abb

Solution

Exercise 563.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes dc, \rtimes dcd, cbba, dcbb, dcdc, cdcb, baca, bbac, aca\ltimes, ca \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. cbdbaaad
2. dadcbc
3. cbbacdabb

4. cccdbacb

Solution

Exercise 564.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes\ltimes, ee, bb, bd, ac, ab, da, ce, dd, e\ltimes\}$

1. cdc
2. aabddbdddda
3. baeea
4. ceaadeeaaea

Solution

Exercise 565.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes ab, \rtimes abc, dbad, bada, bcdb, daec, abcd, cdba, adae, aecd, ecd\ltimes, cd\ltimes\ltimes, d\ltimes\ltimes\ltimes\}$

1. bceaabdeb
2. cacbbadb
3. acce
4. baadc

Solution

Exercise 566.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\ \rtimes\ \rtimes b, \rtimes\ \rtimes\ \rtimes c, \rtimes\ \rtimes\ \rtimes\ltimes, \rtimes\ \rtimes\ bb, \rtimes\ \rtimes\ ba, \rtimes\ \rtimes\ cc, \rtimes\ \rtimes\ \ltimes\ltimes, \rtimes bbb, \rtimes baa, \rtimes cc\ltimes, \rtimes\ \ltimes\ltimes\ltimes, aabb, baaa, aaaa, bbcc, aaab, abbc, bccc, ccca, cccc, bbb\ltimes, cca\ltimes, ca\ltimes\ltimes, cc\ltimes\ltimes, bb\ltimes\ltimes, c\ltimes\ltimes\ltimes, a\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. ac
2. cbbccbacbc
3. caa
4. cccbcbbcbacc

Solution

Exercise 567.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes bb, \rtimes \rtimes ba, \rtimes \rtimes ab, \rtimes \rtimes c\ltimes, \rtimes bbc, \rtimes abd, \rtimes ba\ltimes, \rtimes c \ltimes, bbdc, dbbd, bdbb, abdb, bdc\ltimes, bbc\ltimes, bc \ltimes \ltimes, dc \ltimes \ltimes, ba \ltimes \ltimes, c \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. bceb
2. be
3. a
4. eb

Solution

Exercise 568.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes c, \rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes cd, \rtimes ad, \rtimes b\ltimes, \rtimes \ltimes \ltimes, daa, aac, ada, acd, cdc, cd\ltimes, dc\ltimes, c \ltimes \ltimes, b \ltimes \ltimes, d \ltimes \ltimes\}$

1. abb
2. bdb
3. ccbbcac
4. abdd

Solution

Exercise 569.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes a, \rtimes \rtimes aa, \rtimes \rtimes ba, \rtimes \rtimes b\ltimes, \rtimes baa, \rtimes aaa, \rtimes aa\ltimes, \rtimes b \ltimes \ltimes, bbaa, aabb, abba, baab, bbab, aaab, babb, baa\ltimes, aab\ltimes, aa \ltimes \ltimes, ab \ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bbababbabb
2. aababababb
3. bba
4. bbbaa

Solution

Exercise 570.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes d, \rtimes \rtimes aa, \rtimes \rtimes cd, \rtimes \rtimes d\ltimes, \rtimes aab, \rtimes cdc, \rtimes d \ltimes \ltimes, bdba, dbac, dcbd, cdcb, bacc, cbdb, acc\ltimes, aab\ltimes, ab \ltimes \ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. ddaccacb
2. c
3. bcdbaccbb
4. a

Solution

Exercise 571.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes a, \rtimes\ltimes, bb, ba, ab, aa, bc, ad, db, c\ltimes, d\ltimes\}$

1. cccb
2. b
3. ddcd
4. accddbda

Solution

Exercise 572.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes d, \rtimes \rtimes dd, \rtimes \rtimes bc, \rtimes \rtimes d\ltimes, \rtimes ddb, \rtimes bc\ltimes, \rtimes d \ltimes \ltimes, dbac, accb, bacc, ddba, ccb\ltimes, cb \ltimes \ltimes, bc \ltimes \ltimes, d \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. cb
2. acc
3. dbabd
4. dddbbd

Solution

Exercise 573.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes e, \rtimes ea, \rtimes ad, eca, dee, eec, aea, cae, ade, ea\ltimes, a \ltimes \ltimes\}$

1. e
2. eacc
3. ce
4. dbcdcb

Solution

Exercise 574.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes ba, \rtimes ac, cac, cab, cba, acb, bac, bab, aba, aca, ab\ltimes, ba\ltimes, a\ltimes \ltimes, b\ltimes \ltimes\}$

1. cabaaacab
2. accacaabccc
3. acbcabbcaac
4. baababcbc

Solution

Exercise 575.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes d, bd, da, aa, ab, ad, db, dd, c\ltimes, b\ltimes\}$

1. daeabebce
2. ebddaeceb
3. daeabaa
4. eadccdd

Solution

Exercise 576.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes e, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes d, \rtimes \rtimes da, \rtimes \rtimes ea, \rtimes \rtimes ab, \rtimes \rtimes e\ltimes, \rtimes abe, \rtimes eaa, \rtimes da\ltimes, \rtimes e \ltimes \ltimes, bead, abea, adec, eade, dec\ltimes, eaa\ltimes, aa \ltimes \ltimes, da \ltimes \ltimes, ec \ltimes \ltimes, c \ltimes \ltimes\ltimes, e \ltimes \ltimes\ltimes, a \ltimes \ltimes\ltimes\}$

1. acbb
2. bc
3. aeddcdc
4. dcecddb

Solution

Exercise 577.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes d, \rtimes\rtimes a, \rtimes db, \rtimes a\ltimes, dca, cac, bdc, cdd, cad, dcd, acc, cca, ddc, dbd, ad\ltimes, a\ltimes\ltimes, d\ltimes\ltimes\}$

1. ac
2. ccbcaaaacc
3. bcdaadbcabad
4. cccaabdb

Solution

Exercise 578.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes a, \rtimes\rtimes b, \rtimes aa, \rtimes bb, \rtimes b\ltimes, abb, baa, bbb, aab, bba, bab, aba, aa\ltimes, bb\ltimes, a\ltimes\ltimes, b\ltimes\ltimes\}$

1. aaabba
2. aab
3. aaaa
4. ab

Solution

Exercise 579.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes bb, \rtimes a\ltimes, baa, aab, bba, bab, aba, ab\ltimes, a\ltimes\ltimes, b\ltimes\ltimes\}$

1. baaaabbaa
2. bbabbbbb
3. ba
4. aabbaabbab

Solution

Exercise 580.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes c, \rtimes cb, \rtimes b\ltimes, cab, abc, bbb, cbb, bca, bbc, abe, be\ltimes, e \ltimes \ltimes, b \ltimes \ltimes\}$

1. ε
2. cab
3. cddb
4. dc

Solution

Exercise 581.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes aa, \rtimes \rtimes ca, \rtimes aab, \rtimes ca\ltimes, abca, bcac, aabc, cac\ltimes, ac \ltimes \ltimes, ca \ltimes \ltimes, a \ltimes \ltimes\ltimes, c \ltimes \ltimes\ltimes\}$

1. aa
2. ε
3. a
4. ac

Solution

Exercise 582.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes\ltimes, \rtimes \rtimes aa, \rtimes \rtimes \ltimes\ltimes, \rtimes aac, \rtimes \ltimes \ltimes\ltimes, aaca, acac, caca, aca\ltimes, ca \ltimes \ltimes, a \ltimes \ltimes\ltimes\}$

1. abcca
2. cbbb
3. cbbcb
4. aabc

Solution

Exercise 583.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes a, \rtimes \rtimes bb, \rtimes \rtimes ca, \rtimes \rtimes a\ltimes, \rtimes caa, \rtimes bba, \rtimes a \ltimes \ltimes, ccac, baba, cacd, babc, acdb, abcc, bbab, bcca, abab, caa\ltimes, cdb\ltimes, aa\ltimes\ltimes, db\ltimes \ltimes, a \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. adcddbacbbac

2. bdc
3. cccaaccddb
4. ε

Solution

Exercise 584.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes b, ac, ba, da, cd, c\ltimes\}$

1. acabdb
2. bc
3. ε
4. cdbc

Solution

Exercise 585.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes da, \rtimes cc, \rtimes d\ltimes, \rtimes \ltimes \ltimes, cee, ecc, eec, cce, da\ltimes, cc\ltimes, d \ltimes \ltimes, c \ltimes \ltimes, a \ltimes \ltimes\}$

1. dacb
2. cbb
3. dacced
4. deeabc

Solution

Exercise 586.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, bc, cb, cc, b\ltimes\}$

1. bab
2. a
3. ba
4. ac

Solution

Exercise 587.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ee, be, ed, dc, ec, ce, b\ltimes, e\ltimes\}$

1. edebddbea
2. bdeaebdcb
3. ε
4. dcecce

Solution

Exercise 588.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dd, bc, db, ad\}$

1. bdccbcdaa
2. abcd
3. adca
4. daabc

Solution

Exercise 589.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes d, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes ca, \rtimes\rtimes cc, \rtimes\rtimes d\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes cab, \rtimes ccc, \rtimes d\ltimes\ltimes, \rtimes\ltimes\ltimes\ltimes, caba, babe, abab, abe\ltimes, ccc\ltimes, cc\ltimes\ltimes, be\ltimes\ltimes, c\ltimes\ltimes\ltimes, e\ltimes\ltimes\ltimes, d\ltimes\ltimes\ltimes\}$

1. c
2. abeea
3. e
4. da

Solution

Exercise 590.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\ \rtimes\ \rtimes a, \rtimes\ \rtimes\ \rtimes d, \rtimes\ \rtimes\ de, \rtimes\ \rtimes\ ae, \rtimes\ \rtimes\ db, \rtimes aec, \rtimes deb, \rtimes db\ltimes, ebac, accc, bacc, deba, ccca, cca\ltimes, aec\ltimes, ca\ltimes\ltimes, db\ltimes\ltimes, ec\ltimes\ltimes, c\ltimes\ltimes\ltimes, a\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. eccaae
2. abaa
3. ε
4. aeaaeeb

Solution

Exercise 591.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes c, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes cb, \rtimes\rtimes ca, \rtimes\rtimes b\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes cba, \rtimes cac, \rtimes b\ltimes \ltimes, \rtimes \ltimes \ltimes\ltimes, baba, cbab, abaa, baac, acbc, aacb, abab, cac\ltimes, cbc\ltimes, bc \ltimes \ltimes, ac \ltimes \ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bac
2. bccbccb
3. bcab
4. cbaabbacaa

Solution

Exercise 592.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ee, ca, be, ac, aa, ec, a\ltimes\}$

1. ε
2. aab
3. c
4. bceabbebe

Solution

Exercise 593.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes b, bb, da, dc, ab, dd, cd, b\ltimes\}$

1. addcacadad
2. bbaa
3. bc
4. bdbacaacb

Solution

Exercise 594.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bb, \rtimes a\ltimes, \rtimes \ltimes \ltimes, abb, bba, bab, ba\ltimes, a \ltimes \ltimes\}$

1. baaa
2. aa
3. aaaba
4. b

Solution

Exercise 595.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, bb, ba, ab, aa, a\ltimes\}$

1. bb
2. aaaabaab
3. bbbbb
4. bbabbbaa

Solution

Exercise 596.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes a, ac, ba, da, aa, cb, ad, dd, c\ltimes, d\ltimes\}$

1. dddbaadbd
2. bcdaaadaa
3. cadabadd
4. cadaccbac

Solution

Exercise 597.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes \rtimes a, \rtimes ad, \rtimes d\ltimes, ade, ecc, dee, eec, cc\ltimes, d \ltimes \ltimes, c \ltimes \ltimes\}$

1. c
2. cd

3. eca
4. eac

Solution

Exercise 598.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ca, bd, ba, aa, dc\}$

1. caabbadbab
2. cbbdda
3. baddc
4. adaadad

Solution

Exercise 599.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes d, \rtimes \rtimes bb, \rtimes \rtimes dc, \rtimes \rtimes cd, \rtimes cdd, \rtimes dca, \rtimes bb \ltimes, adad, ddca, ddad, addc, dadd, cdda, dada, dca \ltimes, ca \ltimes \ltimes, bb \ltimes \ltimes, a \ltimes \ltimes \ltimes, b \ltimes \ltimes \ltimes\}$

1. cbaacddbd
2. bbcbdd
3. cdb
4. acaddad

Solution

Exercise 600.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cb, cab, cbb, bca, bbc, ab \ltimes, b \ltimes \ltimes\}$

1. baa
2. c
3. bac
4. bccb

Solution

Exercise 601.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes aa, \rtimes \rtimes b \ltimes, \rtimes \rtimes \ltimes \ltimes, \rtimes aaa, \rtimes b \ltimes \ltimes, \rtimes \ltimes \ltimes \ltimes, bbab, abcb, aaac, cacb, babc, acbb, cbba, aaca, acac, bcb \ltimes, cb \ltimes \ltimes, b \ltimes \ltimes \ltimes\}$

1. ε
2. ccaa
3. acbccacaccb
4. b

Solution
0, 3

Exercise 602.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, dba, ddd, dcd, cab, cba, bab, adb\}$

1. cddd
2. ε
3. cbcac
4. abbabc

Solution
1, 2

Exercise 603.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes b, \rtimes \rtimes \rtimes a, \rtimes \rtimes \rtimes c, \rtimes \rtimes \rtimes \ltimes, \rtimes \rtimes ab, \rtimes \rtimes ca, \rtimes \rtimes bc, \rtimes \rtimes \ltimes \ltimes, \rtimes bca, \rtimes abc, \rtimes ca \ltimes, \rtimes \ltimes \ltimes \ltimes, aaac, caaa, aaaa, bcaa, aac \ltimes, abc \ltimes, bc \ltimes \ltimes, ac \ltimes \ltimes, ca \ltimes \ltimes, c \ltimes \ltimes \ltimes, a \ltimes \ltimes \ltimes\}$

1. ε
2. bcabb
3. ca
4. abc

Solution
0, 2, 3

Exercise 604.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, bb, bc, aa, cc\}$

1. a
2. b
3. bcbccbc
4. ε

Solution
0, 1, 3

Exercise 605.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes ab, cbb, bcc, abb, ccb, bba, bbc, ba\ltimes, a \ltimes \ltimes\}$

1. abba
2. aeaaaec
3. eddeeae
4. a

Solution
0

Exercise 606.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{abbb, aaba, cabc, caca, cccb, cbbb, ccac\}$

1. caaa
2. ε
3. b
4. a

Solution
0, 1, 2, 3

Exercise 607.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{\rtimes c, cd, cb, cc, dc, bc, ca, a\ltimes\}$

1. dacbc
2. ca
3. b
4. bbadabadcd

Solution
1

Exercise 608.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, ba, cb, ac, bc, cc, ca, aa, a\ltimes\}$

1. baa
2. ba
3. daadbcaddbd
4. bca

Solution
0, 1, 3

Exercise 609.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cd, ca, ab, dd, cc\}$

1. ε
2. ababac
3. bbaabbdabcb
4. badbca

Solution
0

Exercise 610.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes d, \rtimes db, dba, ece, aec, bae, ce\ltimes, e \ltimes \ltimes\}$

1. a
2. cccca

3. cedbca
4. dccd

Solution

Exercise 611.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acb, bab, aba, bbb, ccc\}$

1. bbccbac
2. acbca
3. bbbacaaa
4. bcbc

Solution
0, 3

Exercise 612.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes e, \rtimes b, eb, cd, dc, be, ce, ed, ea, e\ltimes, a\ltimes\}$

1. ebebdecd
2. e
3. ε
4. dceebdeba

Solution
1

Exercise 613.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes ac, \rtimes cc, aaa, caa, cca, ccc, aa\ltimes, ac\ltimes, c \ltimes \ltimes, a \ltimes \ltimes\}$

1. ccaa
2. ε
3. ccaaa
4. ac

Solution
0, 2, 3

Exercise 614.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bac, dcd, bcc, adb, bca, abd, ccc\}$

1. c
2. a
3. daadaddb
4. ε

Solution
0, 1, 2, 3

Exercise 615.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{abc, aca, cab, bcc, bcb, bba, caa\}$

1. bababb
2. b
3. cccb
4. ε

Solution
0, 1, 2, 3

Exercise 616.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{eaa, ecd, cbe, bdd\}$

1. ε
2. a
3. beba
4. c

Solution
0, 1, 2, 3

Exercise 617.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{eb, ea, cd, cb\}$

1. e
2. daebdaab
3. ecbce
4. dbcabecb

Solution
0

Exercise 618.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bb, cb, ac, ca, ab, aa, cc\}$

1. caccacccc
2. cbaabaa
3. ccca
4. acabbc

Solution

Exercise 619.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes a, \rtimes\rtimes ab, \rtimes\rtimes ac, \rtimes acb, \rtimes ab\ltimes, bacc, cbab, baba, acba, abac, acc\ltimes, ab\ltimes \ltimes, cc \ltimes \ltimes, c \ltimes \ltimes\ltimes, b \ltimes \ltimes\ltimes\}$

1. bcca
2. bcc
3. ab
4. accb

Solution
2

Exercise 620.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dee, bac, cde, eca, ceb\}$

1. bbbdad
2. eeabaec

3. cbbaea
4. ε

Solution
0, 1, 2, 3

Exercise 621.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes b, \rtimes c, \rtimes\ltimes, ba, bb, cb, bc, dc, ca, ad, c\ltimes, a\ltimes\}$

1. bbac
2. cc
3. bac
4. ε

Solution
3

Exercise 622.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cab, ccb, bab, cca, ccc\}$

1. badcbaba
2. a
3. ε
4. c

Solution
1, 2, 3

Exercise 623.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aaa, abb, bab, bba, aab, baa, aba, bbb\}$

1. aab
2. bbabaaaaba
3. b
4. ε

Solution

2, 3

Exercise 624.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes \ltimes, \rtimes ac, \rtimes \ltimes \ltimes, eaa, ace, aae, cea, ae\ltimes, e \ltimes \ltimes\}$

1. ddbdc
2. a
3. ecd
4. ε

Solution
3

Exercise 625.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bccc, acab, baed, bbee, decb, eeeb, ecba\}$

1. c
2. dadceeda
3. cdebcdbe
4. cdbccae

Solution
0, 1, 2, 3

Exercise 626.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{adcd, abec, aece, dcbb, ceed\}$

1. cdaa
2. ε
3. cd
4. aceebb

Solution
0, 1, 2, 3

Exercise 627.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aaa, bab, aab, baa, aba\}$

1. a
2. bbabba
3. b
4. ε

Solution
0, 2, 3

Exercise 628.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes\rtimes b, \rtimes\rtimes\rtimes a, \rtimes\rtimes\rtimes\ltimes, \rtimes\rtimes bb, \rtimes\rtimes a\ltimes, \rtimes\rtimes\ltimes\ltimes, \rtimes bba, \rtimes bb\ltimes, \rtimes a\ltimes\ltimes, \rtimes\ltimes\ltimes\ltimes, abaa, bbab, aaaa, baba, baaa, aaa\ltimes, aa\ltimes\ltimes, bb\ltimes\ltimes, a\ltimes\ltimes\ltimes, b\ltimes\ltimes\ltimes\}$

1. aabba
2. a
3. ε
4. b

Solution
1, 2

Exercise 629.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ba, da, cb, ac, ca, ab, aa, a\ltimes\}$

1. daa
2. ε
3. dbd
4. da

Solution
0, 3

Exercise 630.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{dcd, ddc, abb, cda, dcc, cca, bca, dad\}$

1. ε
2. a
3. b
4. aaccc

Solution
0, 1, 2, 3

Exercise 631.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes aa, \rtimes cb, aaa, cba, abb, bba, aab, baa, aa\ltimes, a \ltimes \ltimes\}$

1. c
2. ccccc
3. bccbabc
4. aacb

Solution

Exercise 632.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes c, \rtimes \ltimes, ba, db, ac, cc, ca, ad, a\ltimes\}$

1. ee
2. a
3. ε
4. c

Solution
1, 2

Exercise 633.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes d, \rtimes \rtimes \ltimes, \rtimes da, \rtimes b\ltimes, \rtimes \ltimes \ltimes, bac, aba, aab, acc, daa, cca, caa, aa\ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. b

2. daa
3. aeb
4. ε

Solution
0, 1, 3

Exercise 634.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bb, cb, ab, dd, cc\}$

1. cbc
2. ε
3. a
4. bdbc

Solution
1, 2, 3

Exercise 635.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, da, db, ca, aa, ad, b\ltimes\}$

1. cadb
2. bbaa
3. ε
4. b

Solution
0, 2

Exercise 636.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aaa, bba, aab, baa, aba\}$

1. aba
2. ε
3. bb
4. b

Solution
1, 2, 3

Exercise 637.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{babc, caac, ccaa, abca, cabc\}$

1. b
2. aaaaac
3. a
4. ε

Solution
0, 1, 2, 3

Exercise 638.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes e, \rtimes ed, dcb, edc, cbc, acc, bca, cac, cc\ltimes, c \ltimes \ltimes\}$

1. cdcdb
2. a
3. cacbdeab
4. cdccbeae

Solution

Exercise 639.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, da, bb, db, de, ad, ea\}$

1. ε
2. a
3. c
4. eeebd

Solution
0, 1, 2, 3

Exercise 640.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bac, aec, dbe, acc, dbb, ccc\}$

1. beaede
2. ebdcdede
3. ε
4. babcc

Solution
0, 1, 2, 3

Exercise 641.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dbcc, ccbb, ddcb, cbaa, cacd\}$

1. a
2. bbbcab
3. bbdcdbdbda
4. cadc

Solution
0, 1, 2, 3

Exercise 642.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes c, cd, dc, ca, de, ab, aa, ad, ea, b\ltimes\}$

1. caab
2. bcddc
3. eaacb
4. cab

Solution
0, 3

Exercise 643.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{abb, bab, aab, baa, aba\}$

1. babbbbb
2. aaabbaa
3. ε
4. aaababbbabb

Solution
2

Exercise 644.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cba, cdc, aad, cad\}$

1. ε
2. aad
3. bcb
4. a

Solution
0, 2, 3

Exercise 645.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes\ltimes, \rtimes bd, \rtimes ba, \rtimes b\ltimes, \rtimes\ltimes\ltimes, acb, bdb, cbc, bcd, dbc, bca, cac, cd\ltimes, ba\ltimes, a\ltimes\ltimes, b\ltimes\ltimes, d\ltimes\ltimes\}$

1. ε
2. ba
3. b
4. a

Solution
0, 1, 2

Exercise 646.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{eb, bb, ac, ad, de, ce, dd, ec\}$

1. aebdad

2. ε
3. c
4. a

Solution
1, 2, 3

Exercise 647.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{caac, bbcb, baba, acba\}$

1. b
2. cccbaabcbbac
3. ccbcbaaaab
4. bbccc

Solution
0, 1, 2, 3

Exercise 648.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{abb, aab, baa, aba, bbb\}$

1. b
2. ε
3. bb
4. aa

Solution
0, 1, 2, 3

Exercise 649.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bb, bac, aca, bba, cad, ad\ltimes, bb\ltimes, b \ltimes \ltimes, d \ltimes \ltimes\}$

1. aca
2. ε
3. adbd
4. cd

Solution

Exercise 650.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{eba, bdc, dac, edb, aab, cdb, aed, cea\}$

1. c
2. a
3. ε
4. caee

Solution
0, 1, 2, 3

Exercise 651.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, aa, bb, ab\}$

1. baa
2. ε
3. baba
4. abaaaaa

Solution
1

Exercise 652.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{daca, ccaa, bcda, bacb, aaca, adac\}$

1. ε
2. a
3. ba
4. abddb

Solution
0, 1, 2, 3

Exercise 653.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{dae, ded, cba, cce, ebb, cda, ead\}$

1. ε
2. de
3. c
4. a

Solution
0, 1, 2, 3

Exercise 654.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes a, \rtimes\rtimes d, \rtimes\rtimes\ltimes, \rtimes dc, \rtimes ad, \rtimes\ltimes\ltimes, dcb, dcd, bdc, cda, cbd, da\ltimes, ad\ltimes, a\ltimes\ltimes, d\ltimes\ltimes\}$

1. dadd
2. adcdb
3. bccbb
4. ε

Solution
3

Exercise 655.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes e, \rtimes\rtimes\ltimes, \rtimes ec, \rtimes\ltimes\ltimes, eca, cae, eee, aee, ee\ltimes, e\ltimes\ltimes\}$

1. ecaee
2. ε
3. edbd
4. eab

Solution
0, 1

Exercise 656.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes a, \rtimes c, \rtimes\ltimes, ac, ca, aa, c\ltimes\}$

1. ba
2. ε
3. bc
4. bbb

Solution
1

Exercise 657.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, da, bb, ca, dd, aa, cc\}$

1. daacddbbca
2. ccaccca
3. ε
4. ddcacbabd

Solution
2

Exercise 658.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes \ltimes, \rtimes bc, \rtimes \ltimes \ltimes, aca, cac, aac, bcc, acc, cca, caa, ccc, cc\ltimes, c \ltimes \ltimes\}$

1. bcc
2. ε
3. bbccccaaaa
4. c

Solution
0, 1

Exercise 659.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bb, cd, cb, dc, ee\}$

1. ε

2. ddddbadbdc
3. adeebeddc
4. a

Solution
0, 3

Exercise 660.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cdb, bce, ced, aad\}$

1. bb
2. aecaabab
3. aeddabbc
4. dea

Solution
0, 1, 2, 3

Exercise 661.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes \rtimes b, \rtimes \rtimes dc, \rtimes \rtimes bd, \rtimes \rtimes b\ltimes, \rtimes dca, \rtimes bd\ltimes, \rtimes b \ltimes \ltimes, ddad, cadd, adda, dcad, dad\ltimes, ad \ltimes \ltimes, bd \ltimes \ltimes, b \ltimes \ltimes\ltimes, d \ltimes \ltimes\ltimes\}$

1. a
2. bcacc
3. c
4. b

Solution
3

Exercise 662.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, db, ca, de, bd, ec, ad, a\ltimes\}$

1. edbed
2. aea
3. b
4. bed

Solution

Exercise 663.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aca, bcb, bbc, baa, caa\}$

1. ε
2. accbcbaaa
3. cbcbcbacaa
4. abbcbbcacc

Solution
0

Exercise 664.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baac, abbb, cacb, aaac, accb, babb\}$

1. abbbc
2. acac
3. bbcbbccb
4. bbbbcba

Solution
1, 2, 3

Exercise 665.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bcc, ccb, bbc, bca, bbb\}$

1. acbcca
2. bbcaac
3. cbb
4. b

Solution
2, 3

Exercise 666.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{baac, aacc, ccba, cacb, aabc, ccab, bbbb, bcac\}$

1. abbcbb
2. bcbaa
3. caab
4. ε

Solution
0, 1, 2, 3

Exercise 667.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes c, \rtimes cb, bac, cba, acc, cca, ccc, ca\ltimes, a \ltimes \ltimes\}$

1. bcaaac
2. cbbbb
3. acaaa
4. cbacca

Solution
3

Exercise 668.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, cb, ac, ca, ab, aa, cc\}$

1. b
2. acca
3. ε
4. ac

Solution
0, 2

Exercise 669.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: {⋊⋊⋊b, ⋊⋊⋊a, ⋊⋊⋊⋉, ⋊⋊ba, ⋊⋊bb, ⋊⋊a⋉, ⋊⋊⋉⋉, ⋊bbb, ⋊ba⋉, ⋊a⋉⋉, ⋊⋉⋉⋉, $bbbb$, $bbba$, $bbab$, $abba$, $babb$, bba⋉, ba⋉⋉, a⋉⋉⋉}

1. a
2. ε
3. ba
4. aaaaabba

Solution
0, 1, 2

Exercise 670.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: {⋊⋊⋊a, ⋊⋊⋊e, ⋊⋊ab, ⋊⋊ea, ⋊eae, ⋊ab⋉, $aeac$, $bdab$, $cbda$, $acbd$, $eaea$, $eacb$, $daba$, eae⋉, aba⋉, a⋉⋉, ba⋉⋉, ae⋉⋉, a⋉⋉⋉, e⋉⋉⋉, b⋉⋉⋉}

1. dabed
2. ab
3. eae
4. eabbbcb

Solution
1, 2

Exercise 671.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: {⋊ ⋊ ⋊b, ⋊ ⋊ ⋊⋉, ⋊ ⋊ ba, ⋊ ⋊ b⋉, ⋊ ⋊ ⋉⋉, ⋊baa, ⋊b ⋉ ⋉, ⋊ ⋉ ⋉⋉, $aaab$, $abaa$, $bbab$, $baab$, $aabb$, $abba$, $aaba$, $baba$, $baaa$, aba⋉, ba ⋉ ⋉, a ⋉ ⋉⋉, b ⋉ ⋉⋉}

1. aaaabaaa
2. aaabbaaabaaa
3. baabaaaabbab
4. ε

Solution
3

Exercise 672.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{\rtimes c, \rtimes\ltimes, ba, bb, cb, db, be, ab, bd, ec, aa, b\ltimes, c\ltimes\}$

1. ε
2. cb
3. c
4. ebcdabbceeaa

Solution
0, 1, 2

Exercise 673.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes b, \rtimes\rtimes a, \rtimes ba, \rtimes ab, bac, acd, aca, dca, cdc, caa, aad, cac, ab\ltimes, ad\ltimes, b\ltimes\ltimes, d\ltimes\ltimes\}$

1. ab
2. bacdcaad
3. ddacbccd
4. bacaad

Solution
0, 1, 3

Exercise 674.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, ba, cb, ac, dc, bc, cc, d\ltimes, c\ltimes\}$

1. bcadbb
2. ccd
3. b
4. ca

Solution

Exercise 675.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, bb, cb, ac, aa, cc\}$

1. ε

2. babcabaccbac
3. bcaacabb
4. acbbccccaa

Solution
0

Exercise 676.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, eb, da, cd, ac, dc, ce, b\ltimes, d\ltimes\}$

1. cb
2. dddace
3. eebb
4. c

Solution

Exercise 677.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes a, \rtimes c, \rtimes\ltimes, ba, bb, cd, cb, ac, ca, d\ltimes, c\ltimes\}$

1. caada
2. ccccc
3. ε
4. acca

Solution
2

Exercise 678.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acd, aad, dba, cbc, bda, acc, bdd\}$

1. cdc
2. ε
3. ba
4. cd

Solution

0, 1, 2, 3

Exercise 679.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes \rtimes a, \rtimes ba, \rtimes aa, aaa, aab, baa, aba, aa\ltimes, ba\ltimes, a \ltimes \ltimes\}$

1. aa
2. bbb
3. babb
4. ε

Solution
0

Exercise 680.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{caed, aacb, aaec, cddb\}$

1. a
2. ε
3. dbdddccdc
4. de

Solution
0, 1, 2, 3

Exercise 681.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes a, \rtimes \rtimes c, \rtimes \rtimes \ltimes, \rtimes ca, \rtimes aa, \rtimes \ltimes \ltimes, abc, bac, aca, cab, bcc, cca, aba, cac, aa\ltimes, ac\ltimes, c \ltimes \ltimes, a \ltimes \ltimes\}$

1. aa
2. ccabc
3. ε
4. cbcaa

Solution
0, 2

Exercise 682.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{acdb, addb, eebd, ecbc\}$

1. cabdb
2. a
3. cadabac
4. ε

Solution
0, 1, 2, 3

Exercise 683.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes b, \rtimes\ltimes, eb, bb, db, bc, ca, ee, de, dd, ad, b\ltimes\}$

1. eb
2. ε
3. a
4. b

Solution
1, 3

Exercise 684.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bac, acb, cbc, bab, bbb\}$

1. caa
2. abcbbb
3. bbaccaa
4. ab

Solution
0, 3

Exercise 685.
For each one of the strings below say whether it is generated by the following n-gram grammar:

G^-: $\{bac, acb, aac, cbb, cba, bba\}$

1. b
2. ε
3. a
4. abcaabbccc

Solution
0, 1, 2, 3

Exercise 686.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bdbb, ccaa, bddc, bcad, dcbc, adab, cabc, abcb\}$

1. c
2. ac
3. a
4. ε

Solution
0, 1, 2, 3

Exercise 687.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes \rtimes d, \rtimes \rtimes dd, \rtimes ddd, ccca, accc, aacc, ddda, ddaa, ccac, daac, cac\ltimes, ac\ltimes \ltimes, c\ltimes \ltimes\ltimes\}$

1. babcdb
2. dadbbdcdbb
3. bbdca
4. acbbacdac

Solution

Exercise 688.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{ba, bb, cb, ac, bc, ab, aa, cc\}$

1. acb
2. ε

3. aaacc
4. cb

Solution
1

Exercise 689.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes d, \rtimes b, \rtimes\ltimes, bb, da, db, bc, bd, ad, cc, d\ltimes, c\ltimes\}$

1. daadcabdad
2. cbbabaacdaa
3. a
4. ε

Solution
3

Exercise 690.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{cb, ac, bc, ca, ab, bd, dd, ad\}$

1. dbcaad
2. adcb
3. a
4. ε

Solution
2, 3

Exercise 691.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{bb, ac, be, de, ed, aa\}$

1. aeadd
2. ε
3. b
4. a

Solution

0, 1, 2, 3

Exercise 692.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{abc, bcc, bcb, abb, cca\}$

1. ε
2. cca
3. ccaaab
4. cbba

Solution
0, 3

Exercise 693.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{decb, baae, eded, bbbb\}$

1. a
2. c
3. ε
4. d

Solution
0, 1, 2, 3

Exercise 694.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{accc, acbc, cacb, cbbc, acca\}$

1. abbb
2. cbcbcaaa
3. cab
4. baabbba

Solution
0, 1, 2, 3

Exercise 695.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{eb, bc, be, ca, ab, cc\}$

1. de
2. c
3. ε
4. a

Solution
0, 1, 2, 3

Exercise 696.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes\rtimes e, \rtimes\rtimes b, \rtimes ba, \rtimes be, \rtimes e\ltimes, aca, ede, acc, bab, cac, eed, eac, bee, abe, dea, be\ltimes, cc\ltimes, c\ltimes \ltimes, e \ltimes \ltimes\}$

1. e
2. aebdedeeabdd
3. ε
4. eebbdecceb

Solution
0

Exercise 697.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{aaa, bab, bba, aab, baa, aba, bbb\}$

1. bbaab
2. b
3. baaa
4. ε

Solution
1, 3

Exercise 698.
For each one of the strings below say whether it is generated by the following

n-gram grammar:
G^-: $\{aaaa, bbba, aaab, abba\}$

1. baabbaa
2. aa
3. abb
4. ba

Solution
1, 2, 3

Exercise 699.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{\rtimes \rtimes b, \rtimes bb, \rtimes b \ltimes, aaa, bba, aab, baa, aba, aa \ltimes, a \ltimes \ltimes, b \ltimes \ltimes\}$

1. abbb
2. bbaabbaaaba
3. bbbbaaba
4. baaababababb

Solution

Exercise 700.
For each one of the strings below say whether it is generated by the following n-gram grammar:
G^-: $\{abc, cab, cbb, bcb, bcc, baa, bbb\}$

1. b
2. ε
3. ccbbaa
4. a

Solution
0, 1, 3