1) Consider the following grammar:

\[ \langle S \rangle \rightarrow \langle A \rangle \ a \ \langle B \rangle \ b \]
\[ \langle A \rangle \rightarrow \langle A \rangle \ b \ b \]
\[ \langle B \rangle \rightarrow \ a \ \langle B \rangle \ a \]

Which of the following sentences are in the language generated by this grammar?

a. baab
b. bbbab

c. bbaaaaa

d. bbaab

Ans: (a) YES  \[ \langle S \rangle \rightarrow \langle A \rangle \ a \ \langle B \rangle \ b \rightarrow \ b \ a \ \langle B \rangle \ b \rightarrow \ b a b \]

(b) NO Since it should have aab before the end

(c) NO, it must end in b

(d) YES;  \[ \langle S \rangle \rightarrow \langle A \rangle \ a \ \langle B \rangle \ b \rightarrow \langle A \rangle \ b \ a \ \langle B \rangle \ b \rightarrow \ b a \ \langle B \rangle \ b \rightarrow \ b b \ a \ a \ b \]

2) Consider the following grammar:

\[ \langle S \rangle \rightarrow \ a \ \langle S \rangle \ c \ \langle B \rangle \ a \ \langle A \rangle \ b \]

\[ \langle A \rangle \rightarrow \ c \ \langle A \rangle \ c \]

\[ \langle B \rangle \rightarrow \ d \ \langle A \rangle \]

Which of the following sentences are in the language generated by this grammar?

a. abcd
b. acccbcd

c. acccbcc

d. acd

e. accc
a) YES

b) NO  c should precede d

c) No; since you should start with \(<S> \rightarrow a <S> c <B>\) then you end up with aa to get a b

d) NO

e) \(<S> \rightarrow a <S> c <B> \rightarrow a <A> c <B> \rightarrow a c c <B> \rightarrow acc <A> \rightarrow acce\)

3)

Write a grammar for the language consisting of strings that have \(n\) copies of the letter a followed by the same number of copies of the letter b, where \(n > 0\). For example, the strings ab, aaaaabbb, and aaaaaaaaaabbbbbbbb are in the language but a, abb, ba, and aaabb are not.

Ans: \(S \rightarrow a S b\)

\(S \rightarrow ab\)

4) What is the difference between an intrinsic attribute and a nonintrinsic synthesized attribute?

Ans: The value of an intrinsic attribute is supplied from outside the attribute evaluation process, usually from the lexical analyzer. A value of a synthesized attribute is computed by an attribute evaluation function