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Gradiance Online Accelerated Learning

Submission number:	67752
Submission certificate:	AI722997
Submission time:	2014-03-08 22:18:46 PST (GMT - 8:00)

Number of questions:	5
Positive points per question:	3.0
Negative points per question:	1.0
Your score:	15

Based on Sections 5.1 and 5.4 of HMU. Note: there are many other questions on these topics; this homework is a recommended set.

1. Here is a context-free grammar G:

```
S → AB
A → 0A1 | 2
B → 1B | 3A
```

Which of the following strings is in L(G)?

a) 000021130011

b) 0021113002111

c) 00211100211

d) 021300211

Answer submitted: **d)**

You have answered the question correctly.

2. Consider the languge L={a}. Which grammar defines L?

a) G_1:S → AC|a, A → c|b|ε

b) G_1:S → AC|a|ab, A → c|ε

c) G_1:S → AC|C, A → b

d) G_1:S → AB|C, A → b, C → ε

Answer submitted: **a)**

You have answered the question correctly.

3. The grammar G:

S → SS | a | b

is ambiguous. That means at least some of the strings in its language have more than one leftmost derivation. However, it may be that some strings in the language have only one derivation. Identify from the list below a string that has exactly TWO leftmost derivations in G.

a) aaaa

b) ba

c) aba

d) bb

Answer submitted: **c)**

You have answered the question correctly.

4. Consider the grammars:

G_1: S → SaS | aa | a
G_2: S → SS | ε
G_3: S → SS | a
G_4: S → SS | aa
G_5: S → Sa | a
G_6: S → aSa | aa | a
G_7: S → SAS | ε

Describe the language of each of these grammars. Then, identify from the list below a pair of grammars that define the same language.

a) G_4, G_7

b) G_5, G_6

c) G_5, G_2

d) G_1, G_7

Answer submitted: **b)**

You have answered the question correctly.

5. Programming languages are often described using an extended form of context-free grammar, where square brackets are used to denote an optional construct. For example, A → B[C]D says that an *A* can be replaced by a *B* and a *D*, with an optional *C* between them. This notation does not allow us to describe anything but context-free languages, since an extended production can always be replaced by several conventional productions.

Suppose a grammar has the extended productions:

```
A → B[CDE]FGH | BCD[EFG]H
```

Convert this pair of extended productions to conventional productions. Identify, from the list below, the conventional productions that are equivalent to the extended productions above.

a) `A → BCDEFGH | BH`

b) `A → BCDEFGH | BFGH | BCDH | BH`

c)
```
A → BA1FGH | BCDA2H
A1 → CDE | ε
A2 → EFG | ε
```

d)
```
A → BA1H
A1 → CDE | EFG | ε
```

Answer submitted: **c)**

You have answered the question correctly.