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## 2.11: Practice Quiz

Due No due date

Points 10

Questions 10

Time limit None

Allowed attempts 2

### Instructions

The questions in this quiz are derived from the content presented in Module 2. The practice quiz is intended as a knowledge check for mastery of objectives in the module. It provides a sample of questions you will see in the final exam for the course.

### Attempt history

	Attempt	Time	Score
KEPT	Attempt 2	6 minutes	10 out of 10
LATEST	Attempt 2	6 minutes	10 out of 10
	Attempt 1	40 minutes	9 out of 10

Score for this attempt: 10 out of 10  
Submitted 8 Jul at 1:28  
This attempt took 6 minutes.

Last attempt details:	
Time:	6 minutes
Current score:	10 out of 10
Kept score:	10 out of 10

2 Attempts so far  
🕒 View previous attempts  
No More Attempts available

Question 11 / 1 pts

We are given the grammar rules

A → F B E

B → A C

These rules are only some of the rules of a larger grammar G, but we are not given the remaining rules of G. We are told that A is the start symbol of G and that the following holds:

$\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$

$\{\epsilon, e\} \subseteq \text{FIRST}(E)$

$\{\epsilon, f, g\} \subseteq \text{FIRST}(F)$

Recall that end of file is denoted EOF. The symbol  $\subseteq$  is used to denote set inclusion. For example,  $\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$  means that  $\epsilon$ , c, and d are all elements of  $\text{FIRST}(C)$ . Which of the following must hold?

☐ EOF ∈ FIRST(B)

☐ a ∈ FIRST(B)

☐ c ∈ FIRST(B)

☒ f ∈ FIRST(B)

☐ ε ∈ FIRST(B)

☐ d ∈ FIRST(B)

Correct!

Question 21 / 1 pts

Consider the following grammar G:

$S \rightarrow ABC \mid AC \mid A \mid B$

$A \rightarrow aB$

$B \rightarrow bC \mid a$

$C \rightarrow cD$

$D \rightarrow dA$

Recall that a non-terminal A is generating if  $A \Rightarrow^* w$  holds for some string w of terminals. In other words, non-terminal A can generate a string of terminals. This does not always hold. For example if the only rule of a grammar is  $S \rightarrow aS$ , then S is not generating. For the grammar G above, the **generating** non-terminals are

☐ None

☐ A, B and S only

☐ B only

☐ A and B only

Correct!

☒ A, B, C, D, and S

### Question 3

1 / 1 pts

Consider the following grammars (S is the start symbol)

G1:  $S \rightarrow AB$

$A \rightarrow B$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

G2:  $S \rightarrow A \mid B$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

G3:  $S \rightarrow AB$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

Which of the following is true?

☐ G1 and G3 are ambiguous

☐ only G3 is ambiguous

☐ only G2 is ambiguous

Correct!

☒ G1 and G2 are ambiguous

☐ G2 and G3 are ambiguous

### Question 4

1 / 1 pts

Consider the following grammar G:

$S \rightarrow ABC \mid AC \mid A \mid B$

$A \rightarrow aB$

$B \rightarrow bC \mid a$

$C \rightarrow c D$

$D \rightarrow d A$

Recall that a non-terminal  $A$  is useful if there is a derivation of a string of terminals starting from  $S$  in which  $A$  appears:  $S \Rightarrow^* x A y \Rightarrow^* w$  holds for some  $x$  and  $y$  which are sequences of terminals and non-terminals (possibly empty) and some  $w$  which is a sequence of terminals (possibly empty). For example, if there are only three rules  $S \rightarrow a A$ ,  $A \rightarrow B$  and  $B \rightarrow a$ , then  $A$  is useful because  $S \Rightarrow a A \Rightarrow a B \Rightarrow a a$  is a derivation of the sequence of terminals  $aa$  starting from  $S$  and in which  $A$  appears. If  $A$  is not useful, then we say that it is useless. Which of the following are the **useless** symbols of the grammar  $G$  above?

☐  $A$ ,  $C$ , and  $D$  only

☐  $C$  and  $D$  only

Correct!

☒ None of the above

☐  $D$  only

☐ All non-terminals are useless

### Question 5

1 / 1 pts

We are given the grammar rules

$A \rightarrow F E$

$B \rightarrow A C$

These rules are only some of the rules of a larger grammar  $G$ , but we are not given the remaining rules of  $G$ . We are told that  $A$  is the start symbol of  $G$  and that the following holds:

$\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$

$\{\epsilon, e\} \subseteq \text{FIRST}(E)$

$\{\epsilon, f, g\} \subseteq \text{FIRST}(F)$

Recall that end of file is denoted EOF. The symbol  $\subseteq$  is used to denote set inclusion. For example,  $\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$  means that  $\epsilon$ ,  $c$ , and  $d$  are all elements of  $\text{FIRST}(C)$ . Which of the following must hold (more than one choice or no choice can be correct)?

☐  $\text{EOF} \in \text{FIRST}(B)$

Correct!

☒  $d \in \text{FIRST}(B)$

Correct!

☒  $c \in \text{FIRST}(B)$

Correct!

☒  $\epsilon \in \text{FIRST}(B)$

Correct!

☒  $f \in \text{FIRST}(B)$

### Question 6

1 / 1 pts

Consider the following grammar:

$S \rightarrow ABCD$

$A \rightarrow aA \mid cA \mid \epsilon$

$B \rightarrow bB \mid \epsilon$

$C \rightarrow aC \mid c$

$D \rightarrow A \mid d \mid \epsilon$

Which of the following has two parse trees according to G?

☐ b

☒ ac

☐ bc

☐  $\epsilon$

☐ a

Correct!

### Question 7

1 / 1 pts

We are given the grammar rule

$A \rightarrow FCBE$

which is one rule from a larger grammar G, but we are not given the remaining rules of G. We are told that A is the start symbol of G and that the following holds:

$\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$

$\{\epsilon, e\} \subseteq \text{FIRST}(E)$

$\{\epsilon, f, g\} \subseteq \text{FIRST}(F)$

$\{\epsilon, b\} \subseteq \text{FIRST}(B)$

Recall that end of file is denoted EOF. The symbol  $\subseteq$  is used to denote set inclusion. For example,  $\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$  means that  $\epsilon$ , c, and d are all elements of  $\text{FIRST}(C)$ . Which of the following must hold (more than one choice or no choice can be correct)?

☐  $a \in \text{FOLLOW}(F)$

☒  $b \in \text{FOLLOW}(F)$

☐  $\epsilon \in \text{FOLLOW}(F)$

☐  $f \in \text{FOLLOW}(F)$

☒  $c \in \text{FOLLOW}(F)$

☒  $\text{EOF} \in \text{FOLLOW}(F)$

Correct!

Correct!

Correct!

### Question 8

1 / 1 pts

We are given the grammar rule

$A \rightarrow FCBE$

$A \rightarrow F C B E$

which is one rule from a larger grammar  $G$ , but we are not given the remaining rules of  $G$ . We are told that  $A$  is the start symbol of  $G$  and that the following holds:

$$\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$$

$$\{\epsilon, e\} \subseteq \text{FIRST}(E)$$

$$\{\epsilon, a, b\} \subseteq \text{FIRST}(F)$$

Recall that end of file is denoted EOF. The symbol  $\subseteq$  is used to denote set inclusion. For example,  $\{\epsilon, c, d\} \subseteq \text{FIRST}(C)$  means that  $\epsilon$ ,  $c$ , and  $d$  are all elements of  $\text{FIRST}(C)$ . Which of the following must hold (more than one choice or no choice can be correct)?

Correct!

☒  $a \in \text{FIRST}(A)$

☐  $\text{EOF} \in \text{FIRST}(A)$

Correct!

☒  $c \in \text{FIRST}(A)$

☐  $\epsilon \in \text{FIRST}(A)$

☐  $e \in \text{FIRST}(A)$

☐  $f \in \text{FIRST}(A)$

### Question 9

1 / 1 pts

Consider the following grammar  $G$ :

$$S \rightarrow A B C \mid A C \mid A \mid B$$

$$A \rightarrow a B$$

$$B \rightarrow b C \mid a$$

$$C \rightarrow c D$$

$$D \rightarrow d A$$

Recall that a non-terminal  $A$  is reachable if there is a derivation starting from  $S$  in which  $A$  appears:  $S \Rightarrow^* x A y$  holds for some  $x$  and  $y$  which are sequences of terminals and non-terminals (possibly empty). For example, if there are only two rules  $S \rightarrow a A$  and  $B \rightarrow a$ , then  $A$  is reachable because  $S \Rightarrow a A$  is a derivation starting from  $S$  in which  $A$  appears. On the other hand  $B$  is not reachable because there is no derivation starting from  $S$  in which  $B$  appears. Which of the following are the **reachable** symbols of the grammar  $G$  above?

☐  $A$ ,  $B$ , and  $C$  only

☐  $S$  only

☐  $A$ ,  $B$ , and  $S$  only

☐ None of the above

Correct!

☒  $A$ ,  $B$ ,  $C$ ,  $D$ , and  $S$

### Question 10

1 / 1 pts

Consider the grammar G:

$S \rightarrow A \mid B$

$A \rightarrow aB \mid b \mid c$

$B \rightarrow bA \mid a \mid \epsilon$

Which of the following strings has two parse trees according to G?

☐ aa

☒ none of the above

☐ ab

☐ bb

☐ ba

Correct!

Quiz score: **10** out of 10

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