

CPSC 323, Assignment No.2

(CFG of some statements in C++)

Name: Jesse Shaihor, Jay Vong row.....

Name: Cristian Salinas

50 points

Name

1. (8 points) Consider the following grammar:

$S \rightarrow aSbB \mid A \mid c$

$A \rightarrow cA \mid c$

$B \rightarrow d \mid A$

Trace the grammar to determine which of the following words are accepted or rejected?

- i. accbc (use parse tree) ii. acccdd (use left-most-derivation)

2. (8 points) Given the following CFG:

$S \rightarrow I = E$

$E \rightarrow E + T \mid E - T \mid T$

$T \rightarrow T * F \mid T / F \mid F$

$F \rightarrow (E) \mid I$

$I \rightarrow a \mid b$

Use parsing tree to trace the grammar and decide which of the following statements are accepted or rejected.

- i. $a = a * (b - a * a)$ ii. $b = a * b - b * (a + b)$

3. (8 points) Find the language of the following grammars:

a. $S \rightarrow aS \mid bB \mid aA \mid \lambda$

$B \rightarrow bB \mid aA$

$A \rightarrow aA \mid bA \mid \lambda$

b. $S \rightarrow aS \mid bA \mid \lambda$

$A \rightarrow aA \mid bX \mid \lambda$

$X \rightarrow aX \mid bX \mid \lambda$

4. (9 points) Find a CFG for each of the following languages

- (i) $L = a^* + b^*$ (ii) $L = a^*b^*c^*$ (iii) $L = ab^* + ba^* + c$

Programming assignment

(17 points) Write a program to find the value of a postfix expression. Variables are one or more characters each. We might have some integer numbers as part of the expression. (Hint. Read each part of the expression as a token of type string, if the first character of the token is a letter that indicates the token is a variable name, push its value in stack. If the token is an integer number use the predefined function stoi (member of <string> library) to return its numeric value of the token.

Sample I/O:

<p>Enter a postfix expression with a \$ at the end: 20 jerry 45 + tom - * \$ Enter the value of jerry: 10 Enter the value of tom: 5 Expression's value is 1000 CONTINUE(y/n)? y</p>	<p>Enter a postfix expression with a \$ at the end: myscore yourscore 45 + 100 + * \$ Enter the value of myscore: 3 Enter the value of yourscore: 5 Expressions value is 450 CONTINUE(y/n)? n</p>
--	--

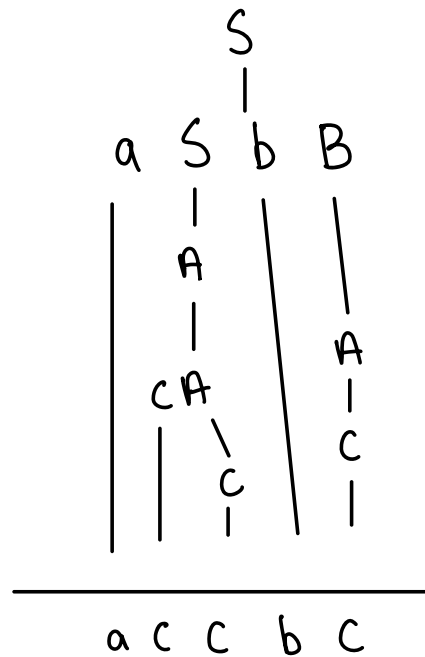
As input, please use the given expressions and the given values

$$\textcircled{1} S \rightarrow aSbB / A / c$$

$$A \rightarrow cA / c$$

$$B \rightarrow d / A$$

$\textcircled{1i}$ accbc



accbc is
accepted

$\textcircled{1ii}$ acccd

$$S \rightarrow a \underline{S} b B$$

$$\Rightarrow a c \underline{A} b B$$

$$\Rightarrow a c c \underline{A} b B$$

$$\Rightarrow a c c c b B$$

stop no rule to start with b
acccd is rejected

② Given the following CFG:

$$S \rightarrow I = E$$

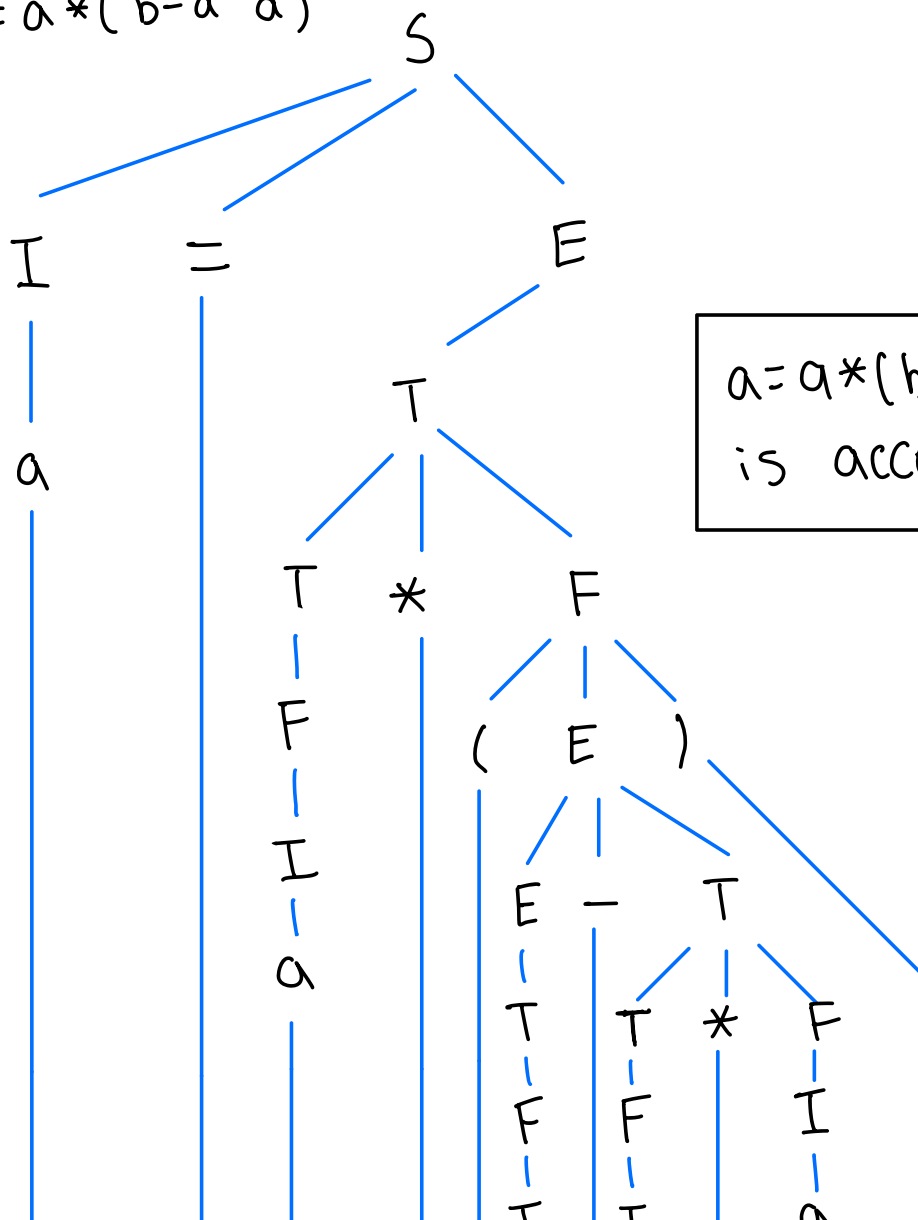
$$E \rightarrow E + T \mid E - T \mid T$$

$$T \rightarrow T * F \mid T / F \mid F$$

$$F \rightarrow (E) \mid I$$

$$I \rightarrow a \mid b$$

②i) $a = a * (b - a * a)$

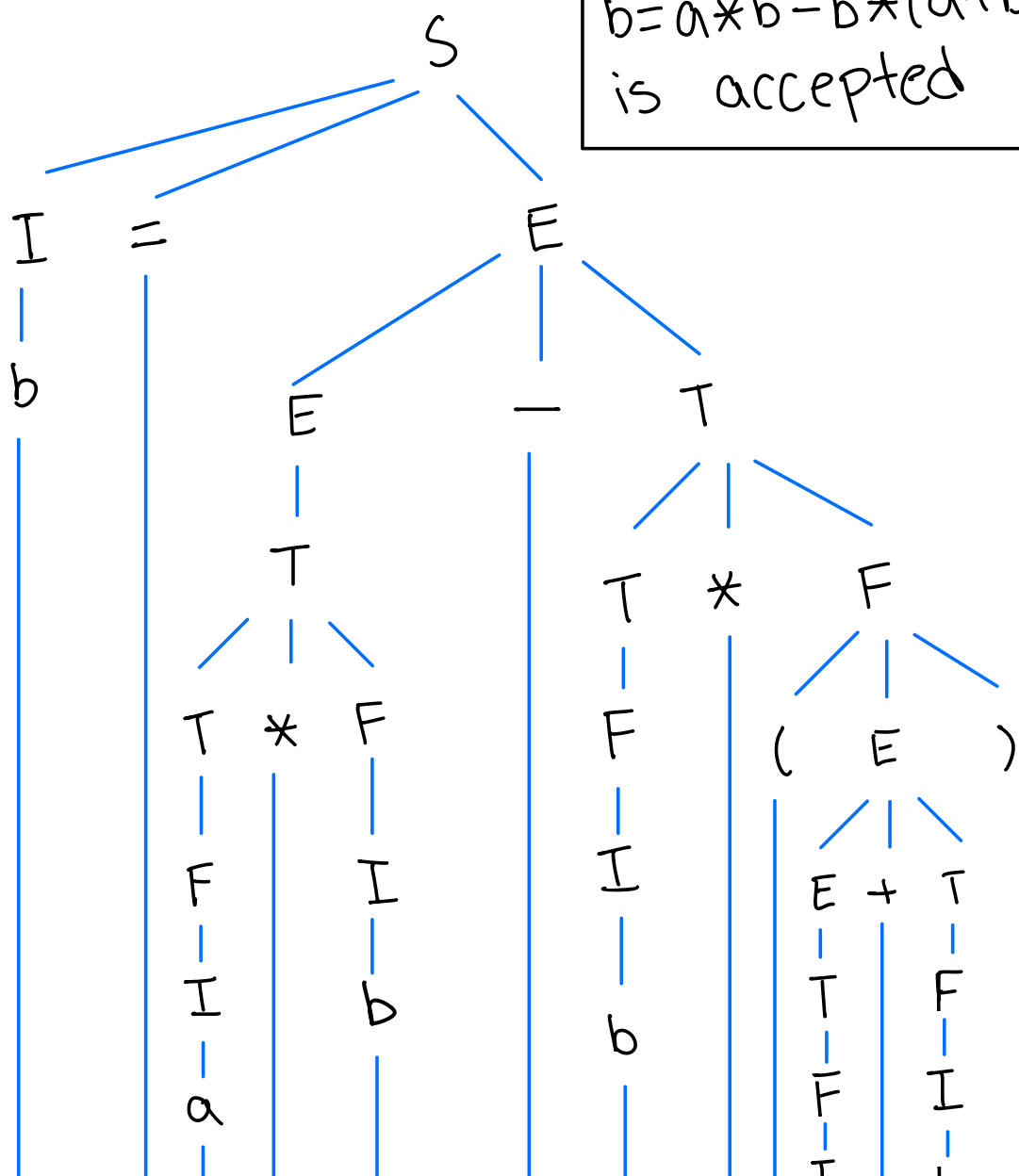


$a = a * (b - a * a)$
is accepted

				b	-	a	*	a)
<hr/>									
a	=	a	*	(b	-	a	*	a

2. $b = a * b - b * (a + b)$

$b = a * b - b * (a + b)$
is accepted



$$b = a * b - b * (a + b)$$

③