CPSC 323, Assignment No.2 Name: Jesse Shaihar, Jay Vang, ...row.....

(CFG of some statements in C++) Name Cristian Salinas

50 points Name .....

1. (8 points) Consider the following grammar:
   S → aSbB | A | c
   A → cA | c
   B → d | 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 → I = E
   E → E+T | E-T | T
   T → T*F | T/F | F
   F → (E) | I
   I → a | 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 → aS | bB | aA |λ B → bB | aA A → aA | bA | λ	b. S → aS | bA |λ A → aA | bX |λ X → aX | bX |λ

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:

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	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

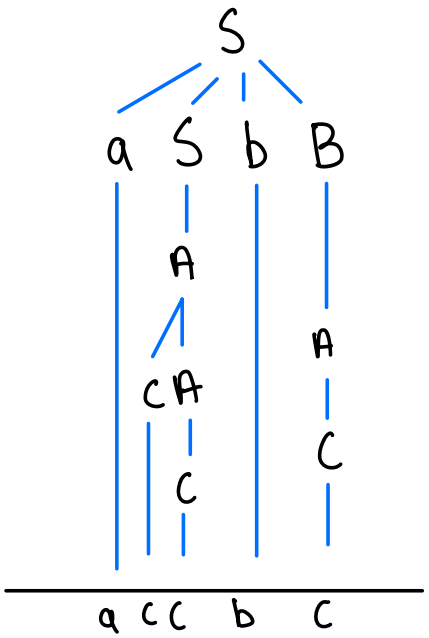
As input, please use the given expressions and the given values

(1) $S \rightarrow aSbB \mid A \mid c$

$A \rightarrow cA \mid c$

$B \rightarrow d \mid A$

(1i) accbc



accbc is accepted

(1ii) acccdd

$S \rightarrow a\underline{S}bB$

$\Rightarrow acc\underline{A}bB$

$\Rightarrow acc\underline{A}bB$

$\Rightarrow acccbB$

stop no rule to start with b

acccdd is rejected

② Given the following CFG:

S → I = E

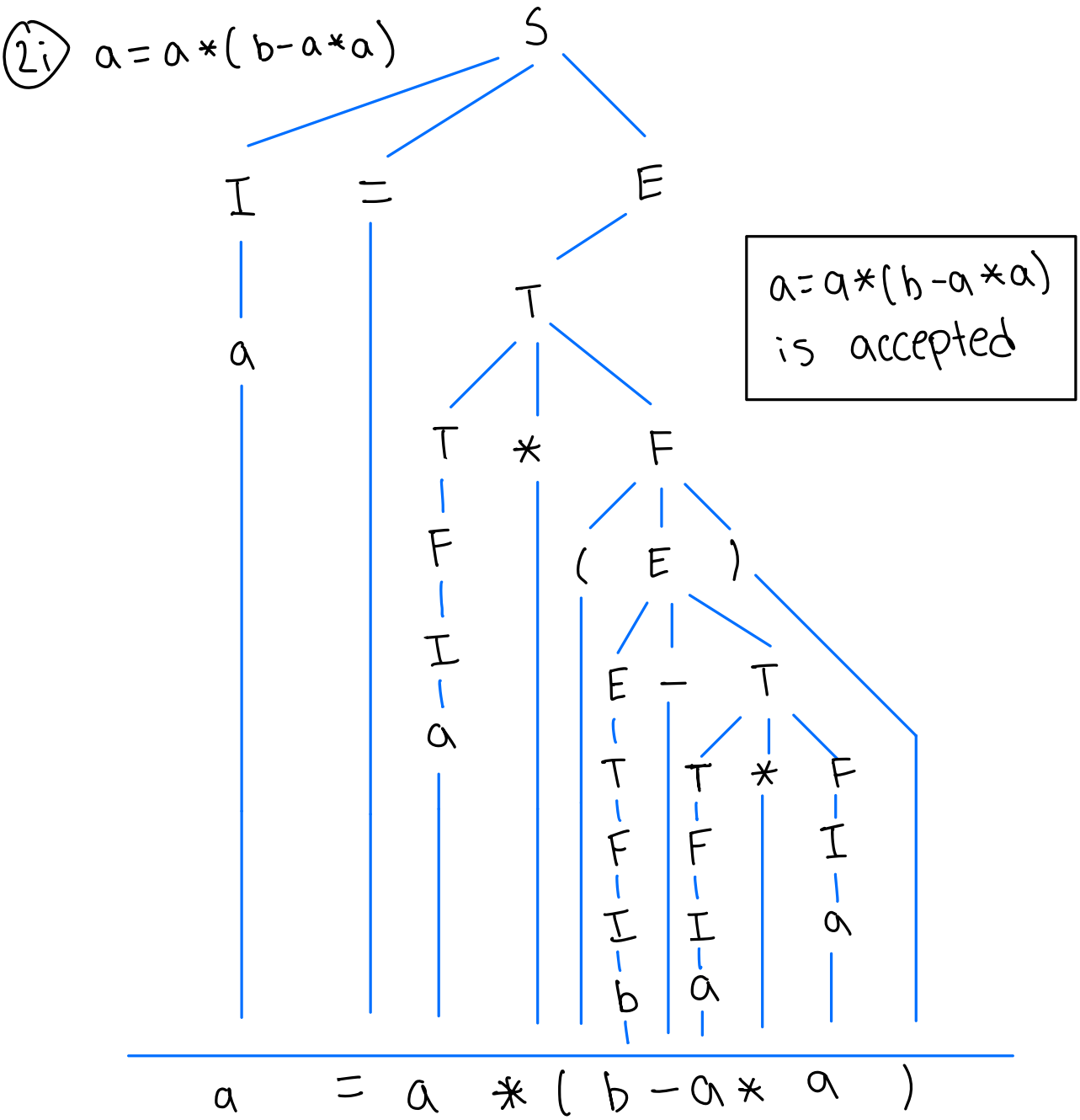
E → E+T | E-T | T

T → T*F | T/F | F

F → (E) | I

I → a | b

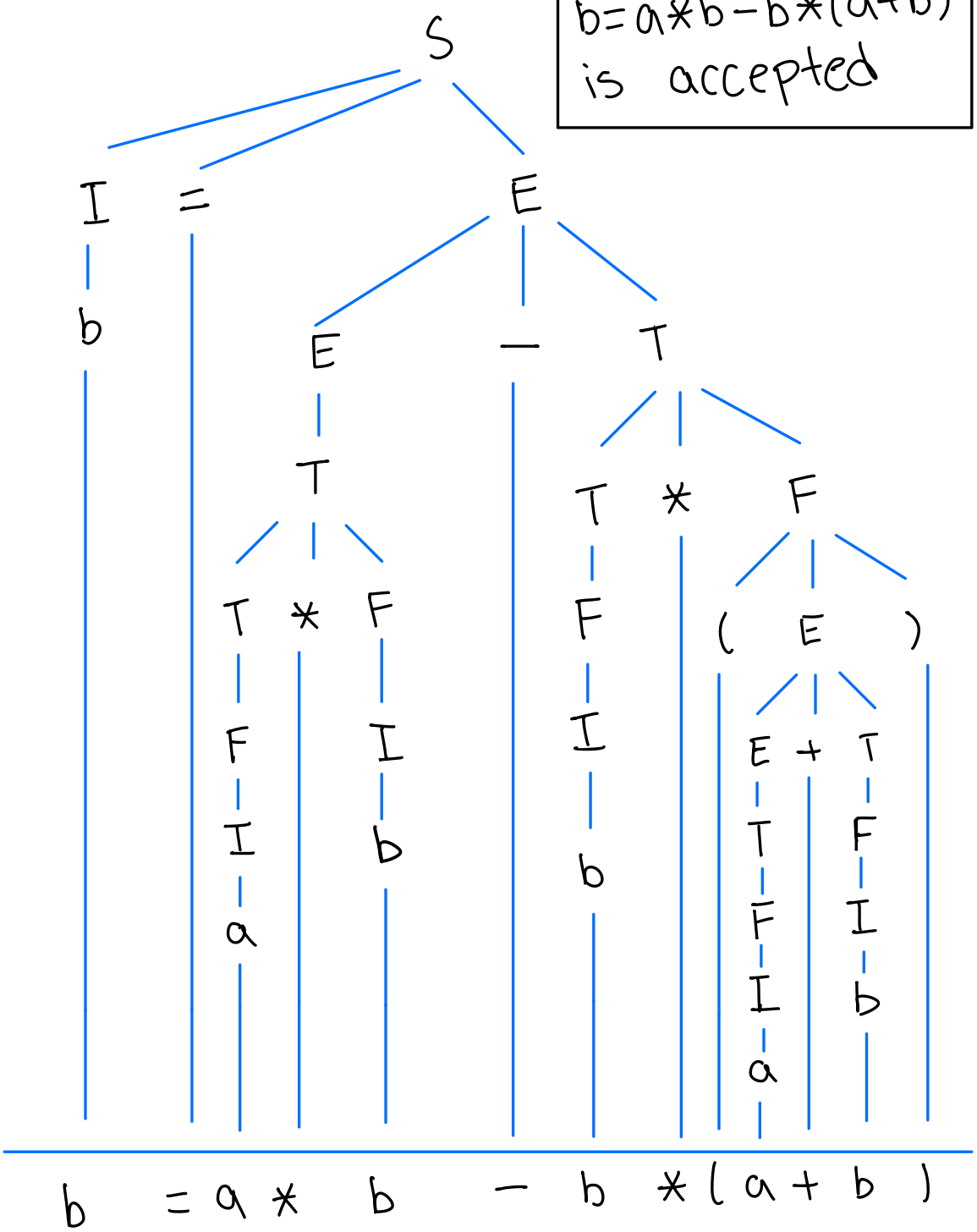
2i) a = a * (b - a * a)



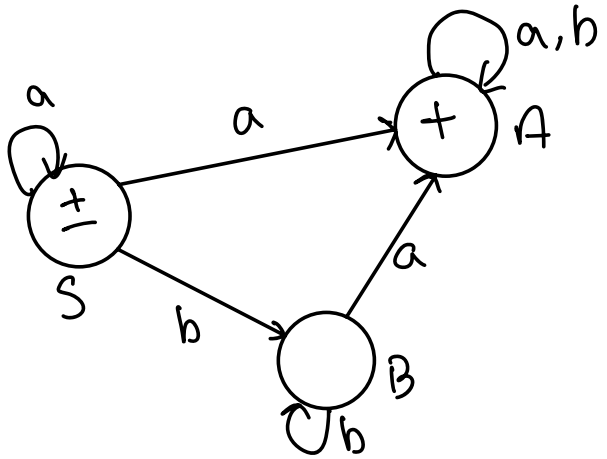
a = a * (b - a * a) is accepted

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

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

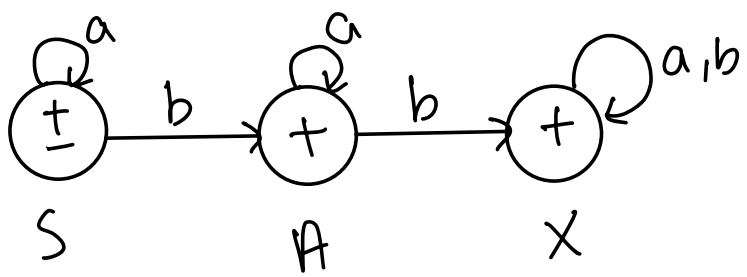


3a



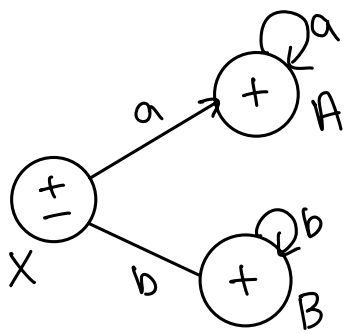
$$L = a^* + a(a+b)^* + bb^* a(a+b)^*$$

3b



$$L = a^* + ba^* + ba^* b(a+b)^*$$

(4i) $L = a^* + b^*$



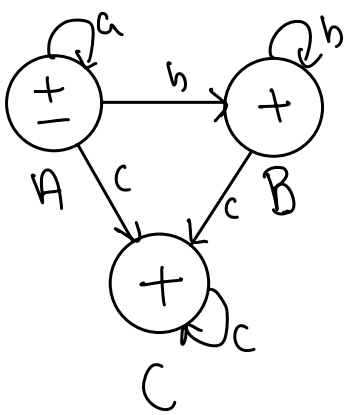
CFG

$X \rightarrow aA \mid bB \mid \lambda$

$A \rightarrow aA \mid \lambda$

$B \rightarrow bB \mid \lambda$

(4ii) $L = a^*b^*c^*$



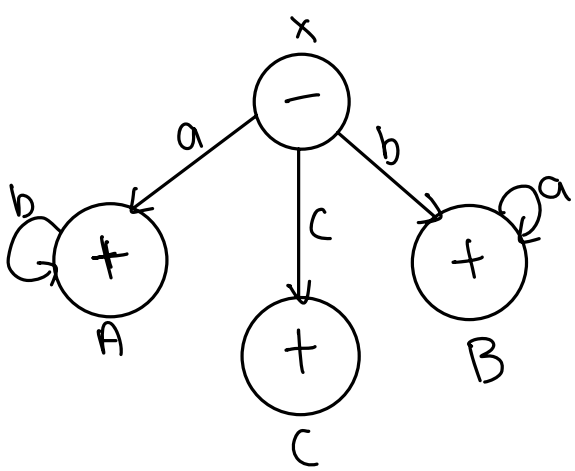
CFG

$A \rightarrow aA \mid bB \mid cC \mid \lambda$

$B \rightarrow bB \mid cC \mid \lambda$

$C \rightarrow cC \mid \lambda$

(4iii) $L = ab^* + ba^* + C$



CFG

$X \rightarrow aA \mid bB \mid cC$

$A \rightarrow bA \mid \lambda$

$B \rightarrow aB \mid \lambda$

$C \rightarrow \lambda$