L3 – MIASHS 2021 2022
Parcours Informatique
UE MIC0602T

TD 1 - Expressions régulières et Grammaires
Solutions

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1.

(a)

$V_N = \{S, T\}$

$V_T = \{a, b\}$

R = {

S → T a T a T a T

T → b T | b | ε

}

(b)

$V_N = \{S, T\}$

$V_T = \{a, b\}$

R1 = {

S → a T | b S | ε

T → b S | ε

}

(c)

$V_N = \{S\}$

$V_T = \{a, b\}$

R = {

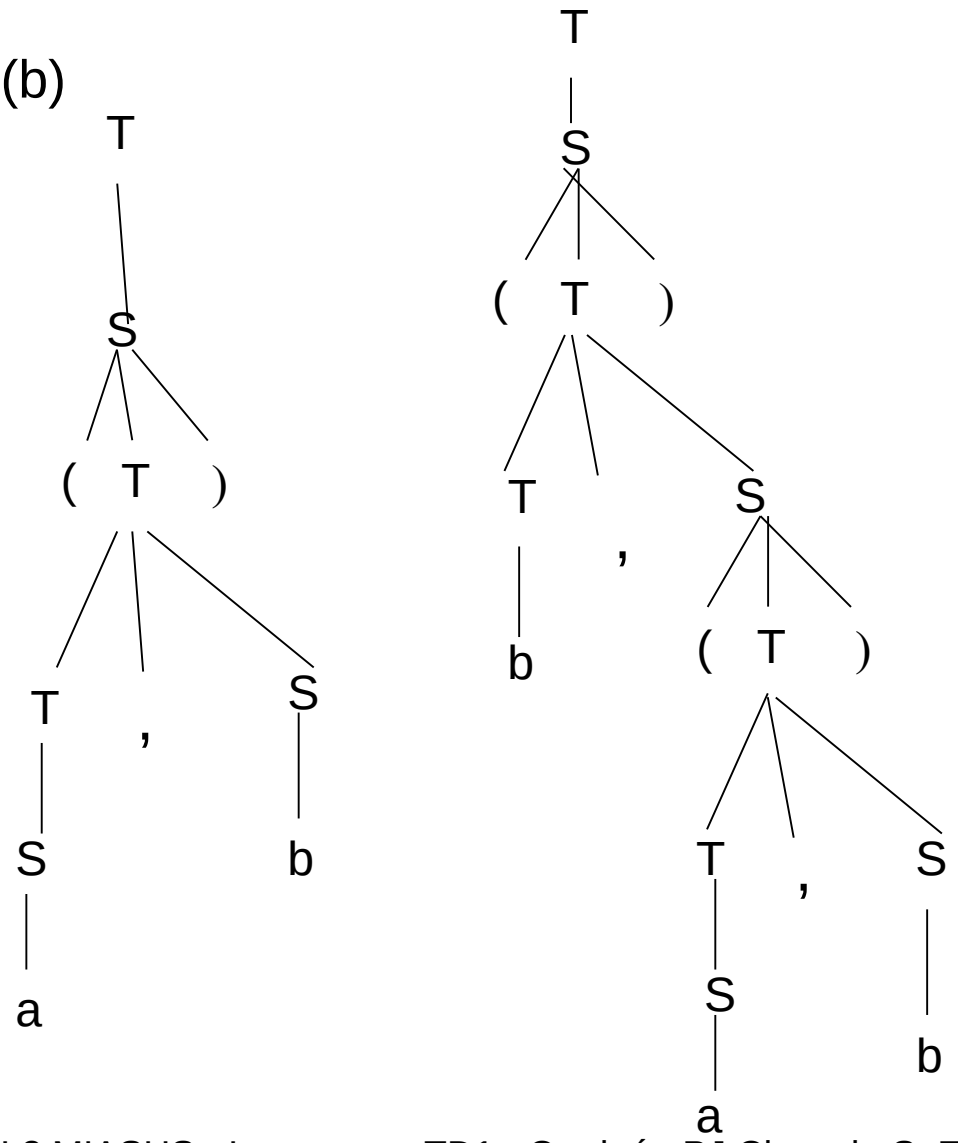
S → a S a | b S b | a

}

2.

(a) $V_N = \{S, T\}$ $V_T = \{(,), a, b, ","\}$ Racine T il peut exister des expressions non parenthésées.

(b)



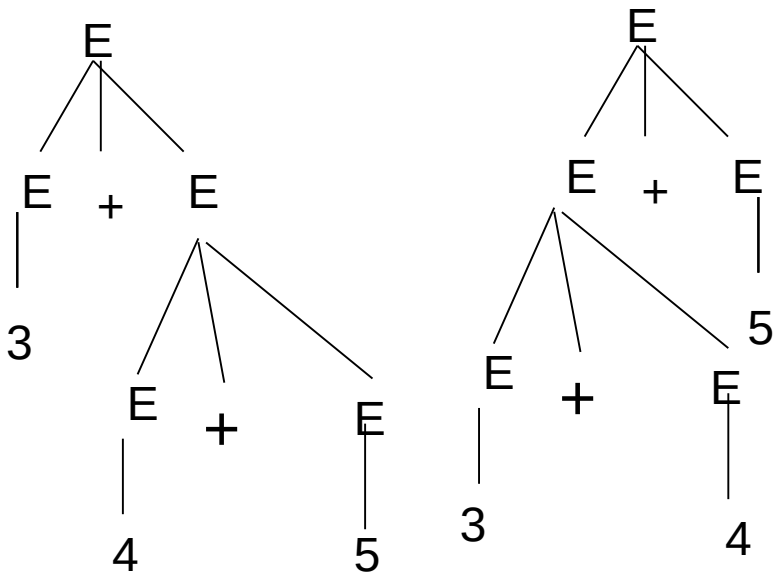
(c)

S → a | b | (T)

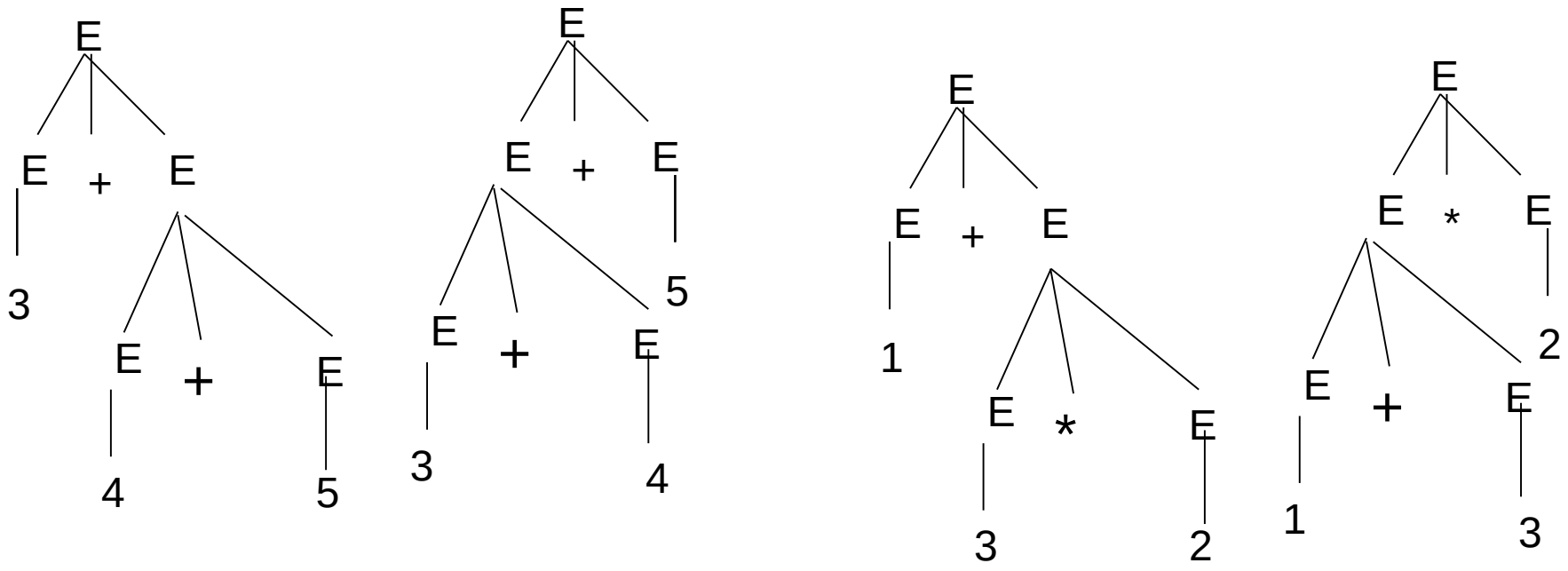
T → S T1

T1 → , S T1 | ε

3.



3.

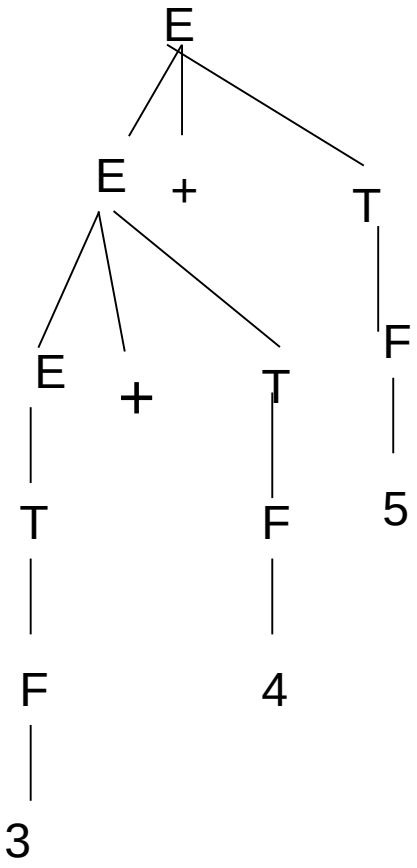


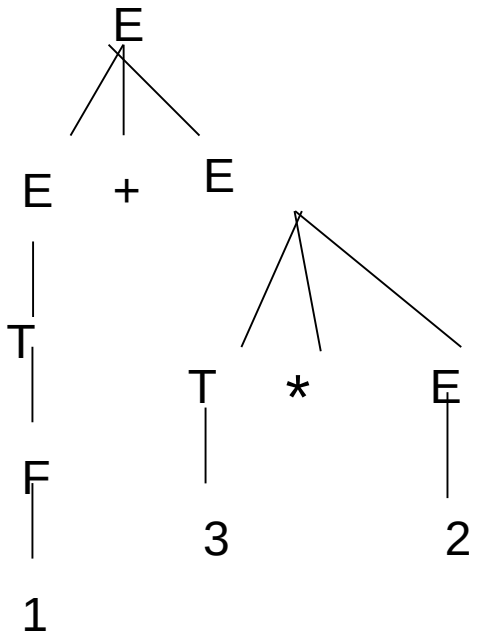
Degré d'ambiguïté = 2 : 2 arbres de dérivation possibles

C'est la sémantique des opérateurs qui permet de choisir l'arbre.

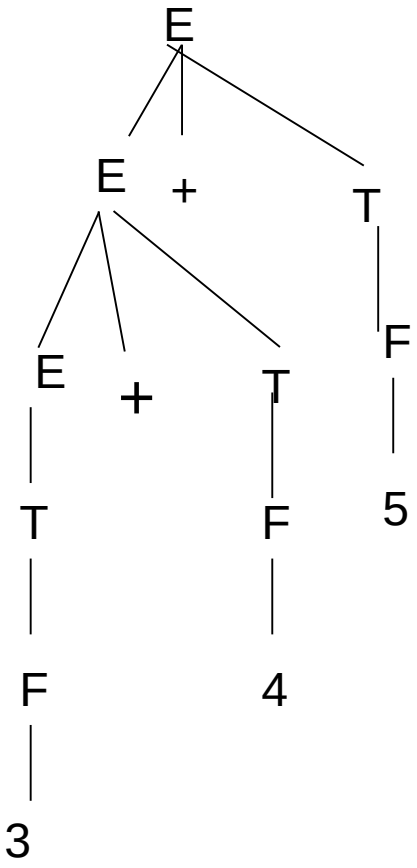
Elle n'est pas décrite dans les règles de la grammaire

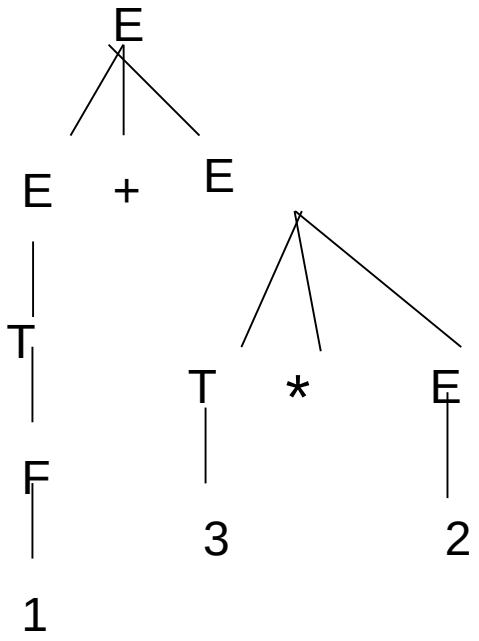
4. (a) Degré d'ambiguïté = 1 : 1 arbre de dérivation possible





4. (a) Degré d'ambiguïté = 1 : 1 arbre de dérivation possible





(b)

E → T E'

E' → + T E' | ε

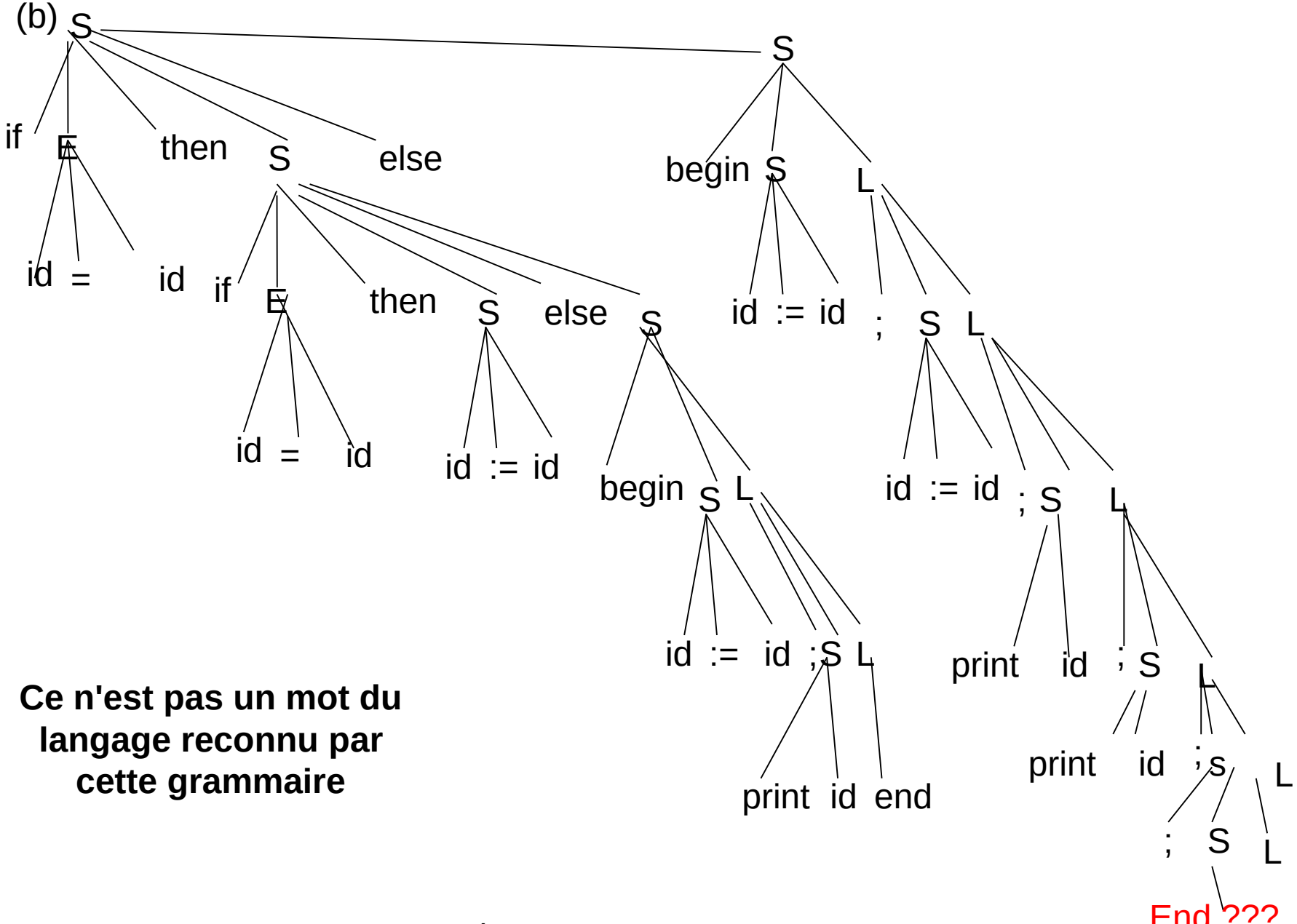
T → F T'

T' → * F T' | ε

F → nombre

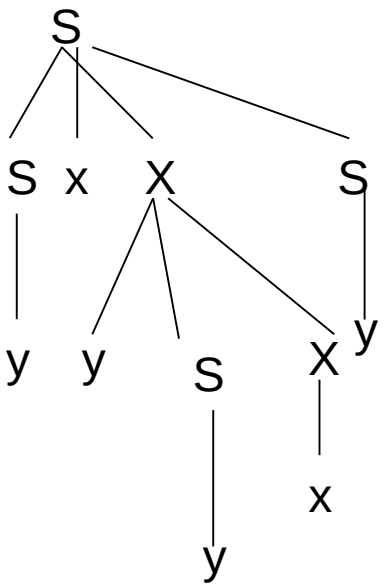
5. (a) V_N = {S, L, E} V_T = {if, then, else, =, :=, begin, end, print, id,; } S

(b)

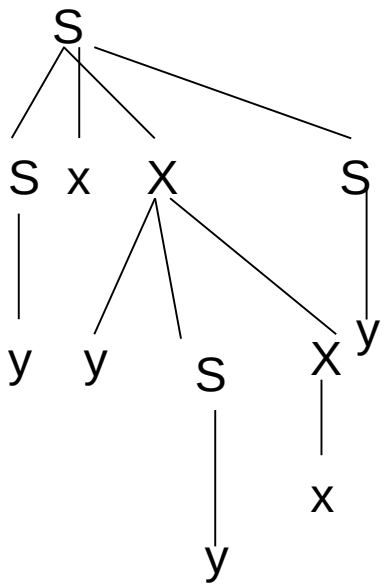


Ce n'est pas un mot du langage reconnu par cette grammaire

6. (a)



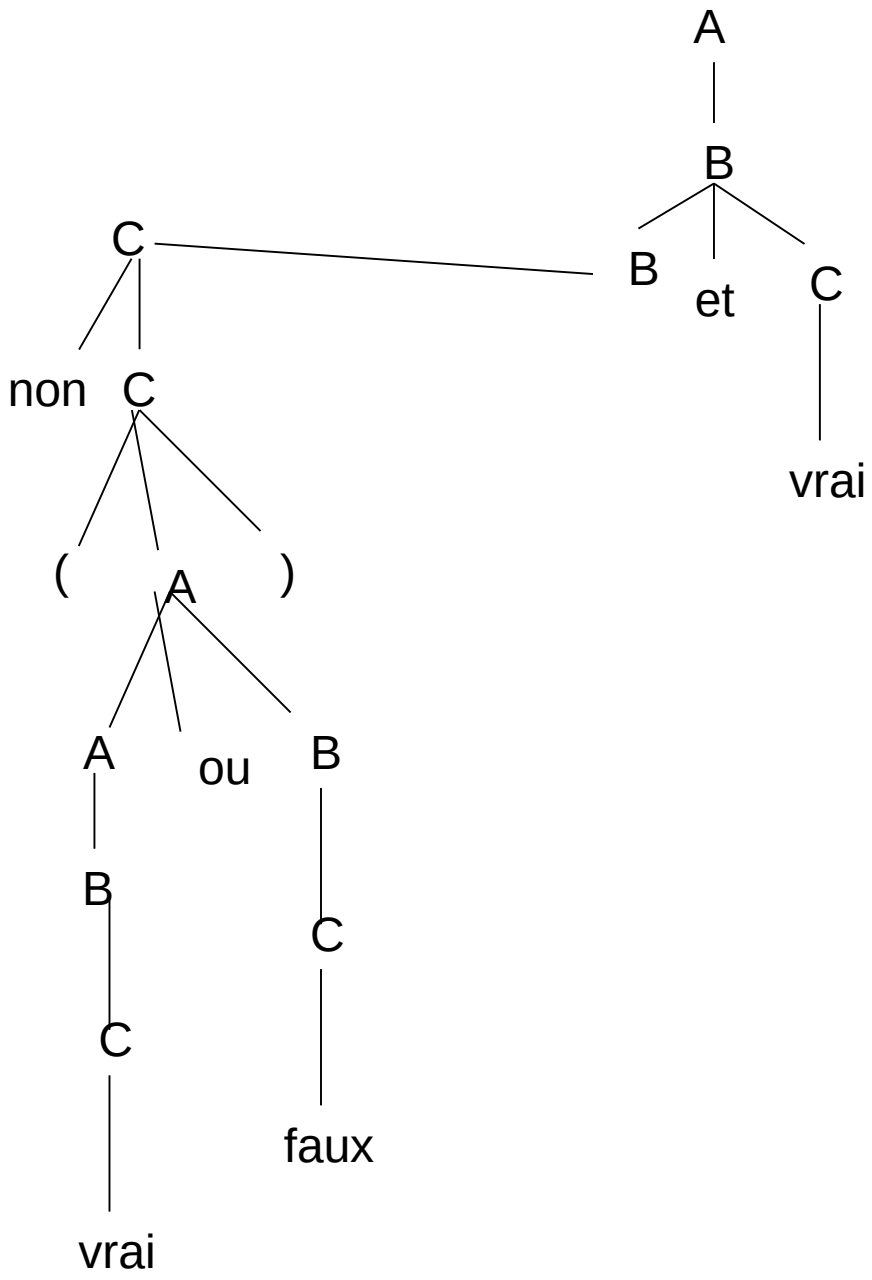
6. (a)



(b)

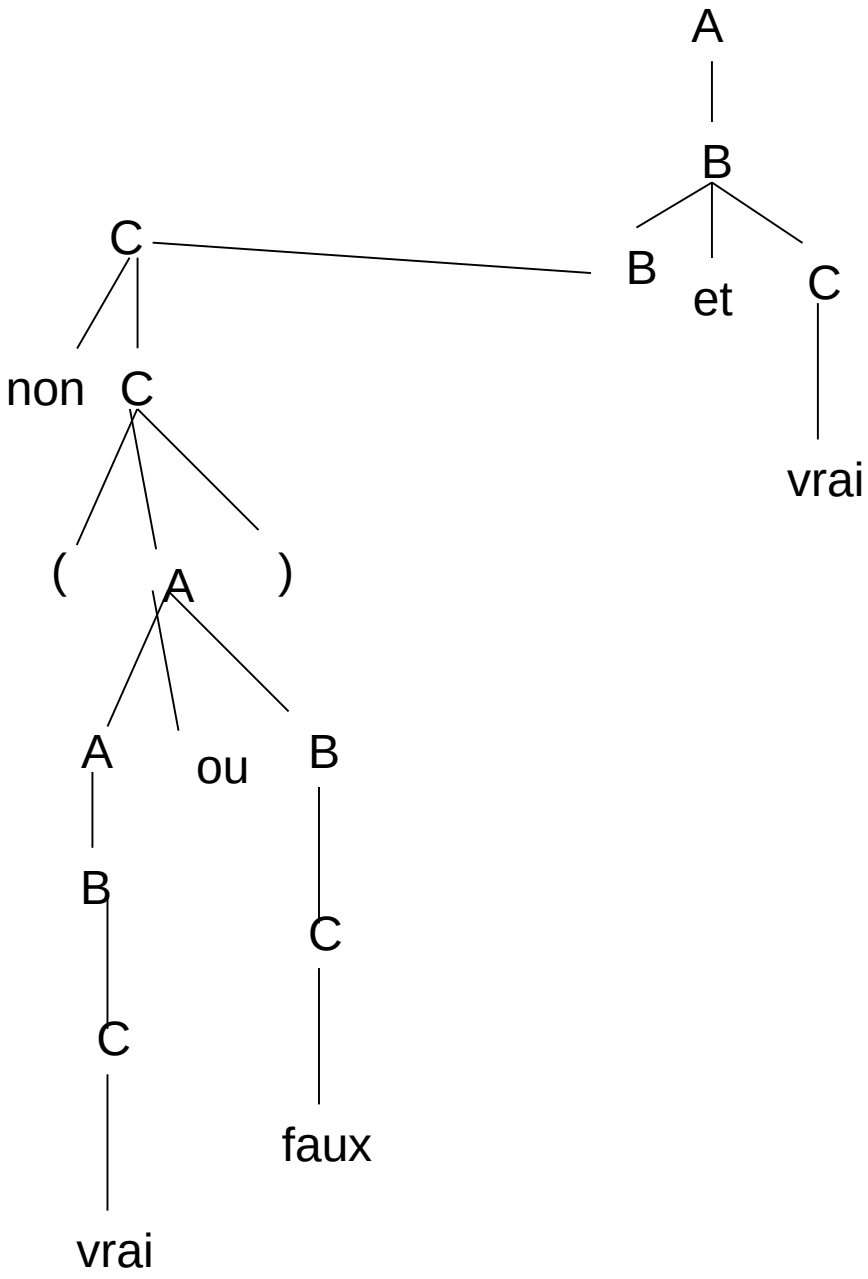
S	→	y S1			
S1	→	x X S S1	| ε		
X	→	y S X	| x	| y	| ε
X	→	y X1	| x	| ε	
X1	→	S X	| ε		

7.
(a)



7.

(a)



(b)

A → B A1

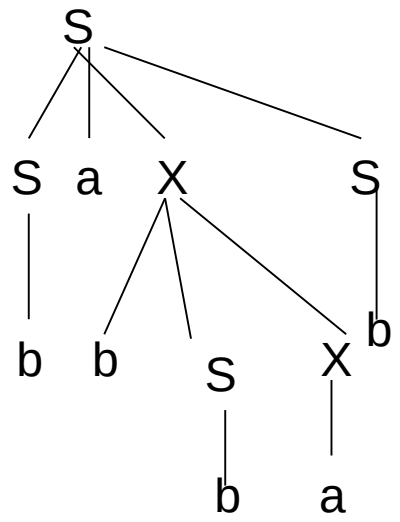
A1 → ou B A1 | ε

B → C B1

B1 → et C B1 | ε

Pas de factorisation

8. (a)



(b) Elimination de la récursivité

S → b S1	1
S1 → a X S S1 | ε	2 3
X → b S X | a | b | ε	4 5 6 7

(b) Elimination de la récursivité

S → b S1 1

S1 → a X S S1 | ε 2 3

X → b S X | a | b | ε 4 5 6 7

(c) Factorisation : X est une source - 4 et 6

X→ b X1 | a | ε 4 5 6

X1 → S X | ε 7 8

(d) Grammaire propre – intégrer les résultats des ε productions dans la grammaire

S → b S1 | b à cause de la règle 3

S1 → a X S S1 | a S S1 | a X S | a S (S1 → ε et X → ε)

X→ b X1 | a | b (X1 → ε)

X1 → S X | S (X → ε)

On recrée des situations d'ambiguïté

Factorisation

S → b S2

S2 → S1 | ε

S1 → a S3 | ε

S3 → X S S1 | S S1 | X S | S

X → b X2 | a

X1 → X1 | ε

X1 → S X2

X2 → X1 | ε

S3 → X S S4 | S S1 | S

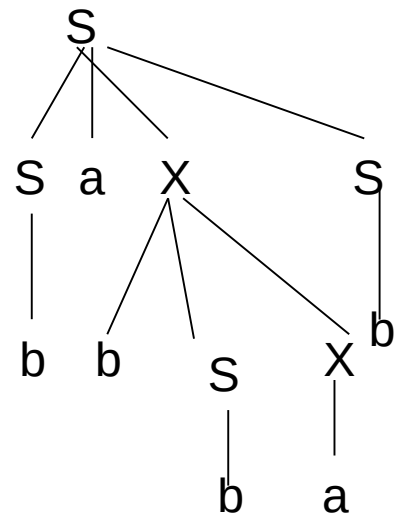
S4 → S1 | ε

S3→ S S5 | X S S4

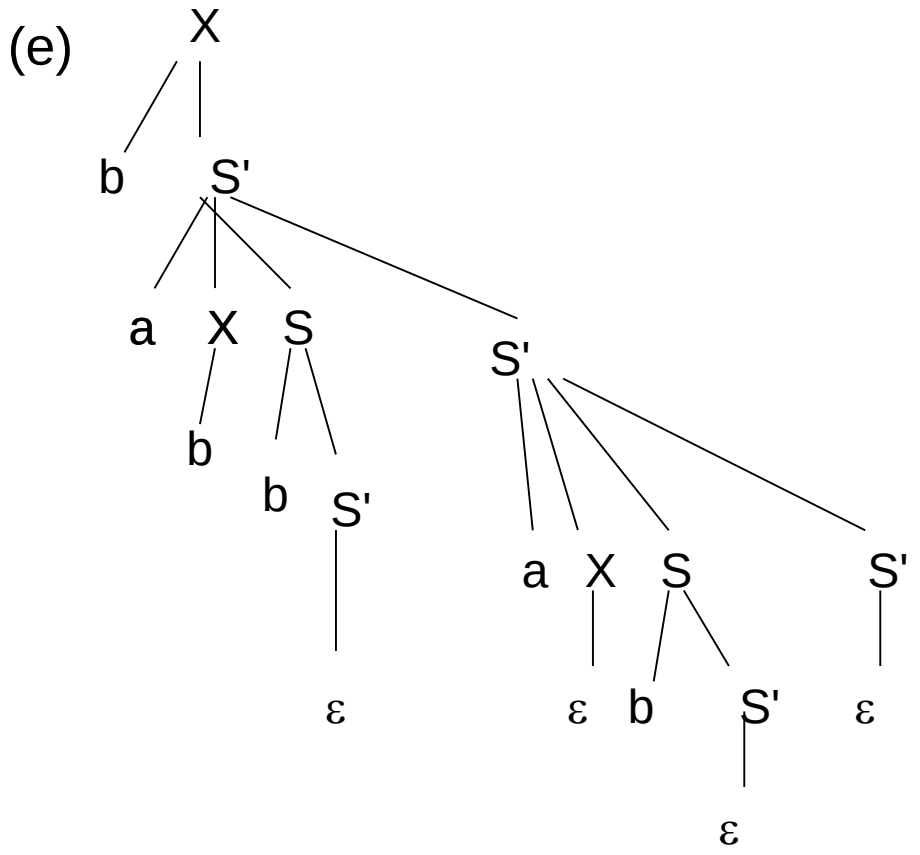
S5 → S1 | ε La grammaire n'est pas propre

Il faut choisir entre propre et non ambigüe

8. (a)



(e)



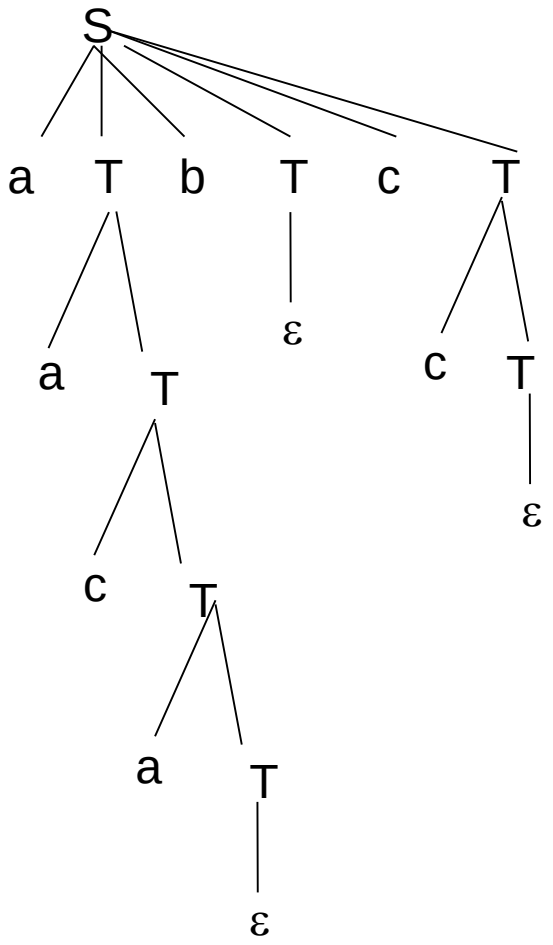
9.(a)

1 2	S →	a	T	b	T	c	T	|	a	T	c	T	b	T |
3 4		b	T	a	T	c	T	|	b	T	c	T	a	T |
5 6		c	T	a	T	b	T	|	c	T	b	T	a	T
7 8 9 10	T →	a	T	|	b	T	|	c	T	|	ε			

9.(a)

1 2	S →	a T b T c T	|	a T c T b T	|	
3 4		b T a T c T	|	b T c T a T	|	
5 6		c T a T b T	|	c T b T a T		
7 8 9 10	T →	a T	| b T	| c T	| ε	

b)



9.(a)

1 2	S →	a T b T c T	| a T c T b T |		
3 4		b T a T c T	| b T c T a T |		
5 6		c T a T b T	| c T b T a T		
7 8 9 10	T →	a T	| b T	| c T	| ε

(c) Grammaire factorisée, non ambiguë

S	→ a T S1	| b T a T c T |		
	b T c T a T	| c T a T b T |		
	c T b T a T			
S1	→ b T c T	| c T b T		
S	→ b T S2	| a T S1 |c T a T b T |		
	c T b T a T			
S2	→ a T c T	| c T a T		
S	→ c T S3	| b T S2 | a T S1 |		
S3	→ a T b T	| b T a T		
S	**→ a T S1**	**| b T S2**	**| c T S3**	
S1	**→ b T c T**	**| c T b T**		
S2	**→ a T c T**	**| c T a T**		
S3	**→ a T b T**	**| b T a T**		
T	**→ a T**	**| b T**	**| c T**	**| ε**

b)