1. Question 1

Assume that ADDOP is left-associative binary operator, which grammar is unambiguous and ensures the associativity of ADDOP?

Chọn một:

○ a. exp → exp ADDOP exp | term

   term → LP exp RP | INT

○ b. exp → term ADDOP exp | term

   term → LP exp RP | INT

○ c. exp → exp ADDOP term | term

   term → LP exp RP | INT

○ d. exp → term ADDOP term | term

   term → LP exp RP | INT
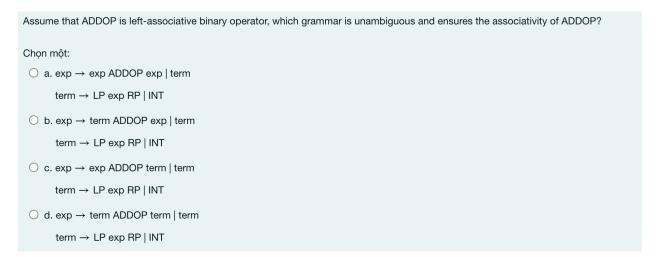
2. Question 2

Assume that RELOP is none-associative binary operator, which grammar is unambiguous and ensures the associativity of RELOP?

Chọn một:

○ a. exp → exp RELOP term | term

   term → LP exp RP | INT

○ b. exp → exp RELOP exp | term

   term → LP exp RP | INT

○ c. exp → term RELOP exp | term

   term → LP exp RP | INT

○ d. exp → term RELOP term | term

   term → LP exp RP | INT

3. Question 3

Assume that NOTOP is a prefix unary operator, which grammar is valid for an expression using NOTOP?

Chọn một:

○ a. exp → exp NOTOP term | term

term → BOOLLIT | LP exp RP

○ b. exp → NOTOP term | term

term → BOOLLIT | LP exp RP

○ c. exp → term NOTOP exp | term

term → BOOLLIT | LP exp RP

○ d. exp → term NOTOP | term

term → BOOLLIT | LP exp RP

4. On the following grammars,

a. Compare the precedence between + and *
b. State the associativity of all operations
c. Evaluate 3-4-5*2

G1:

$S \to S+T \mid S-T \mid T$
$T \to T*F \mid T/F \mid F$
$F \to num$

G2:

$S \to S*T \mid S-T \mid T$
$T \to F+T \mid F/T \mid F$
$F \to num$

G3:

$S \to S*T \mid S/T \mid S+T \mid T$
$T \to T-T \mid F$
$F \to num$

G4:

$S \to T*S \mid S-T \mid S+T \mid T$
$T \to T/T \mid F$

F → num

SOLUTION:
1. C
2. B
3. B
4.
G1:

S → S+T | S-T |T
T → T*F | T/F |F
F → num

    a. * has higher precedence than +
    b. '+-*/' is left-associated
    c. $3 - 4 - 5*2 = 3 – 4 – 10 = -1 – 10 = -11$

G2:

S → S*T | S-T |T
T → F+T | F/T |F
F → num

    a. + has higher precedence than *
    b. '*-' is left-associated, '+/' is right-associated
    c. $3 – 4 – 5*2 = -1 – 5*2 = -6*2 = -12$

G3:

S → S*T |S/T |S+T |T
T → T - T | F
F → num

    a. + and * has the same precedence, but the operations will be executed from left to right (which means we will do * before +)
    b. '*/+' is left-associated, '-' is non-associated
    c. Ambiguous grammar rule with '-' operator?

G4:

S → T*S |S-T |S+T |T
T → T/T |F
F → num

a. + and * has the same precedence, but the operations will be executed from left to right (which means we will do * before +)
b. '*' is right-associated, '-+' is left-associated, '/' is non-associated
c. 3 – 4 – 5*2 cannot be parsed, after matching operator '*' then T = (3-4-5) and S = 2, but rule T has no operator '-'