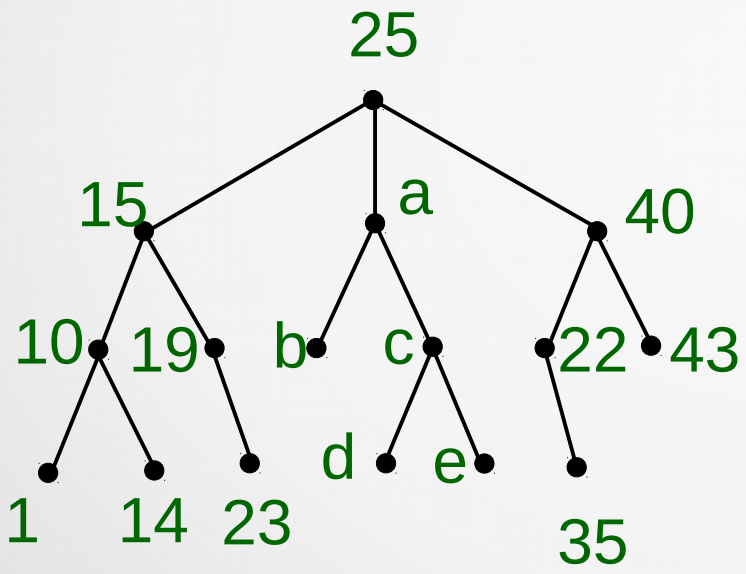
Practice

Exercise 1: Traverse the given tree in preorder, in inorder, and postorder.
List the vertices visited for each of the traversals.



preorder:
- root, then
- children (→)

inorder:
- leftmost child, then
- root
- the rest of children (→)

preorder:
- children (→), then
- root

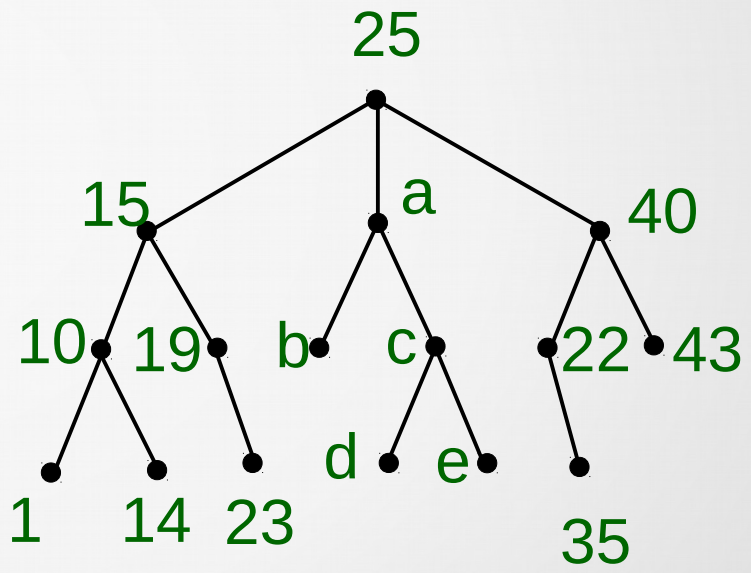
Practice

Exercise 1: Traverse the given tree in preorder, in inorder, and postorder.
List the vertices visited for each of the traversals.

Answer:

preorder traversal:
25, 15, 10, 1, 14, 19, 23,
1, b, c, d, e, 40, 22, 35, 43

inorder traversal:
1, 10, 14, 15, 23, 19, 25, b, a,
d, c, e, 25, 22, 40, 43



postorder traversal: 1, 14, 10, 23, 19, 15, b, d, e, c, a,
35, 22, 43, 40, 25

Practice

Exercise 2: Draw the ordered rooted tree representing arithmetic expression $16 \div 2^3 * 2 - 5 * 4$

Practice

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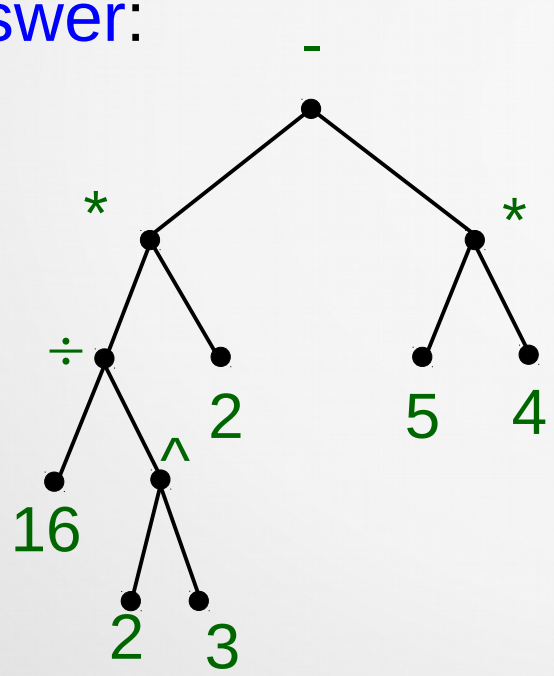
Answer:

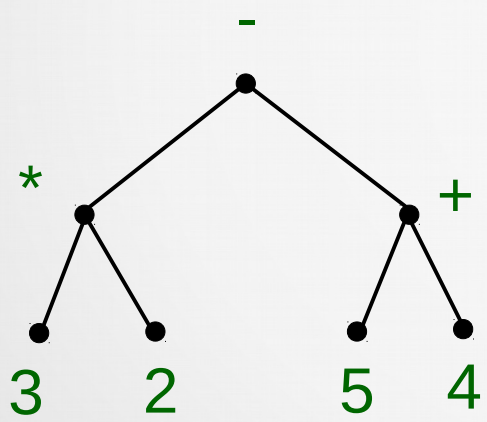


Warning:
the order is important!

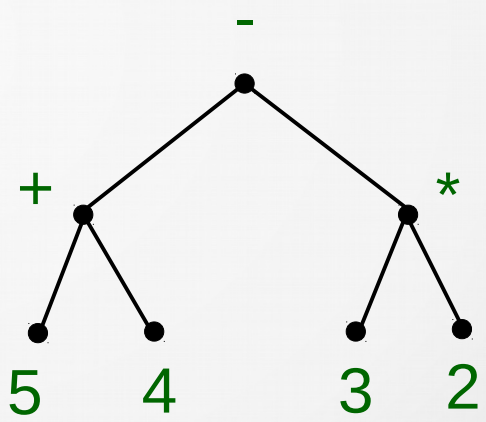
Practice

Exercise 2: Draw the ordered rooted tree representing arithmetic expression $16 \div 2^3 * 2 - 5 * 4$

Warning: the order is important!



corresponds to
3 * 2 – (5 + 4)



corresponds to
(5 + 4) - 3 * 2

a common mistake: to “flip” the branches

Practice

Exercise 3:Write each expression in *infix notation*:

a) ^ 2 + - ÷ 3 3 3 ÷ 8 2
(prefix notation)

b) 1 2 + 7 – 3 * 10 2 ÷ -
(postfix notation)

Practice

Exercise 3:Write each expression in *infix notation*:

a) ^ 2 + - ÷ 3 3 3 ÷ 8 2

(prefix notation)

^ 2 + - ÷ 3 3 3 (8 ÷ 2)

^ 2 + - (3 ÷ 3) 3 (8 ÷ 2)

^ 2 + ((3 ÷ 3) - 3) (8 ÷ 2)

^ 2 ((3 ÷ 3) - 3) + (8 ÷ 2)

2 (3 ÷ 3) - 3 + (8 ÷ 2)

b) 1 2 + 7 – 3 * 10 2 ÷ -

(postfix notation)

1 2 + 7 – 3 * 10 2 ÷ -

(1+2) 7 – 3 * 10 2 ÷ -

((1+2) – 7) 3 * 10 2 ÷ -

((1+2 – 7) * 3) 10 2 ÷ -

((1+2 – 7) * 3) (10÷2) -

((1+2 – 7) * 3) – (10÷2)

Practice

Exercise 4: Evaluate each expression without converting to infix notation:

a) √ – – + 10 ^ 4 2 * ÷ 20 5 2 9 (prefix notation)

b) 1 2 + 3 ^ 28 7 ÷ + 11 – 5 ÷ (postfix notation)

Practice

Exercise 4: Evaluate each expression without converting to infix notation:

a) √ – – + 10 ^ 4 2 * ÷ 20 5 2 9 = 3 (prefix notation)

√ – – + 10 ^ 4 2 * 4 2 9

√ – – + 10 ^ 4 2 8 9

√ – – + 10 16 8 9

√ – – 26 8 9

√ – 18 9

√ 9 = 3

Note that

√ – – + 10 ^ 4 2 * ÷ 20 5 2 9 = $\sqrt{10+4^2-20\div5\times2-9}$

Practice

Exercise 4: Evaluate each expression without converting to infix notation:

b) 1 2 + 3 ^ 28 7 ÷ + 11 – 5 ÷ = 4 (postfix notation)

3 3 ^ 28 7 ÷ + 11 – 5 ÷

27 28 7 ÷ + 11 – 5 ÷

27 4 + 11 – 5 ÷

31 11 – 5 ÷

20 5 ÷

4

Note that

1 2 + 3 ^ 28 7 ÷ + 11 – 5 ÷ = $\dfrac{(1+2)^3+28\div 7-11}{5}$

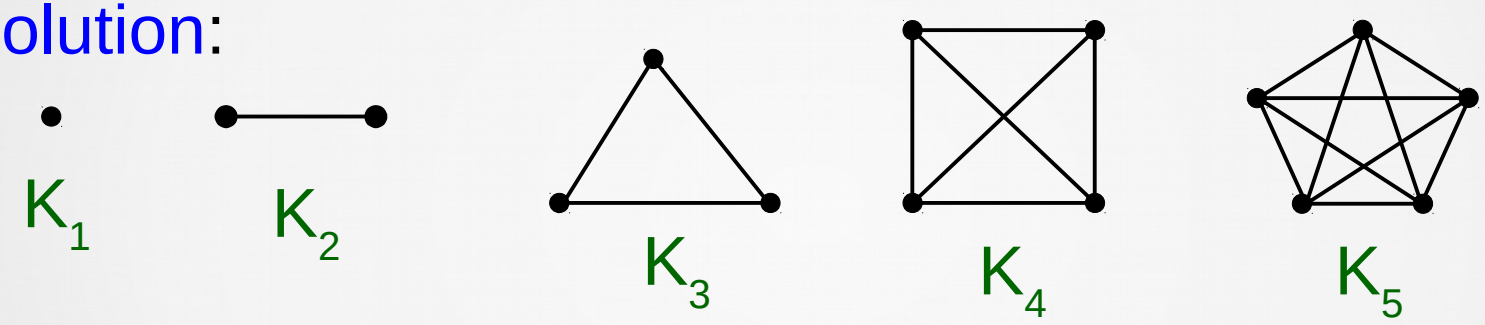
Practice

Exercise 5: How many edges in K_n?

Practice

Exercise 5: How many edges in K_n?

Solution:



0 1 3 6 15

K_1: 0

K_2: 1 + 0 = 1

K_3: 2 + 1 + 0 = 3

K_4: 3 + 2 + 1 + 0 = 6

K_5: 4 + 3 + 2 + 1 + 0 = 15

$$|E(K_n)| = \sum_{i=0}^{n-1} i = \frac{(0+(n-1))n}{2} = \frac{(n-1)n}{2}$$