# CS & IT ENGINEERING



Compiler Design

Intermediate Code & Code Optimization

**DPP** (Discussion Notes)

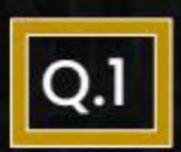




TOPICS TO BE COVERED

01 Question

02 Discussion



### The three addresses code involves\_\_\_.





At most 3 addresses.

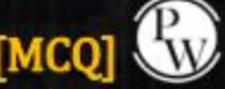
- В.
- Exactly 3 addresses.
- **G**

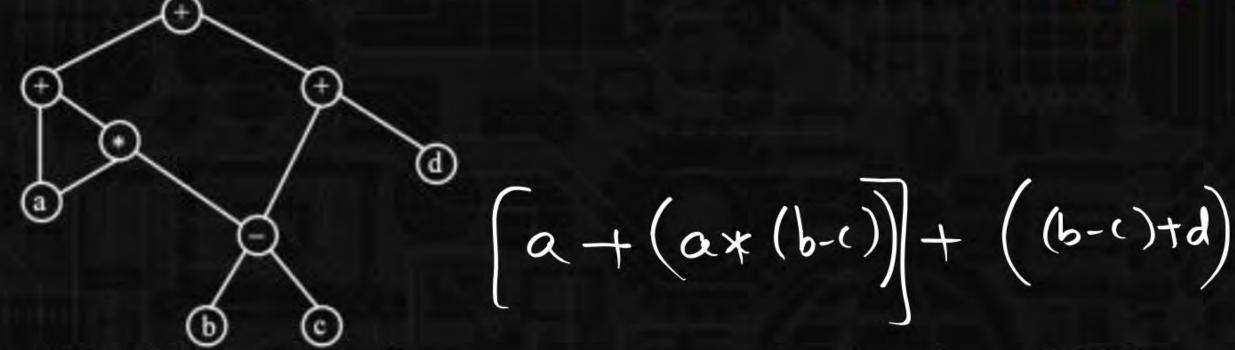
At least 3 addresses.

D.

No unary operator.

## Consider the following DAG (Directed Acyclic graph):



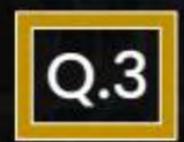


Which of the following is the correct expression for given DAG?

A. 
$$[a*a+(b-c)*(b-c)+d]$$
 B.  $[a+a*(b-c)+(b-c)+d]$ 

$$[a + a * (b - c) + (b - c) + d]$$

$$[a*a+(c-b)*(c-b)+d]$$



## Type checking is performed by:



- Syntax analyses Syntax Syntax Syntax B.
- Semantic analyses
- D. Intermediate code generator

# Which of the following are valid three addresses code (TAC)?



[MCQ]



if a > b goto C



return 0



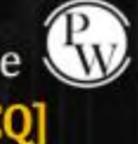
$$x[i] = y;$$

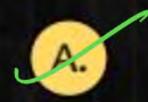


$$a = b*c$$



Which of the following is/are correct about abstract syntax tree (AST)? [MCQ]





AST is also used in program analysis and program transformation systems.



It is a tree representation of the abstract syntactic structure of source code written in a programming language.



It has no impact on the final output of the compiler.



It is the result of syntax analysis phase of a compiler.



How many minimum number of temporary variable created in three addresses code?

Assume precedence order from lowest to highest is -, +, and \*; and consider associativity of + & \* is not important but - is left associative.





Consider the following intermediate code:



1. 
$$loc = -1$$

2. 
$$i = 0$$

3. if 
$$(i < 100)$$
 goto 5

5. 
$$t_1 = 4 * i$$

7. 
$$t_2 = A[t_1]$$

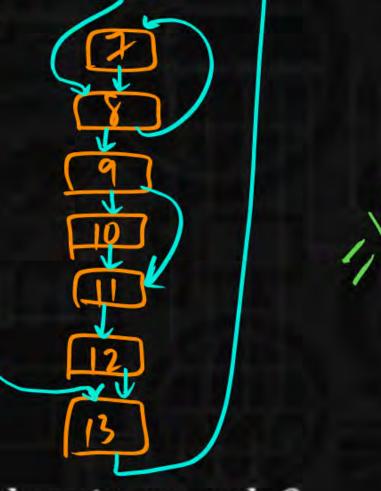
8. if 
$$t_2 = x \text{ go to } -$$

10. 
$$loc = i$$

11. 
$$t_3 = i + 1$$

12. 
$$i = t_3$$



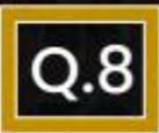


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4

How many number of basic block from the given code?



Consider the following expression.

$$((x * x) * (x * x) * ((x * x) * (x * x)))$$

The total number of internal nodes in DAG representation are \_\_\_\_\_.



- B. 4 nodes and 7 edges
- C. 3 nodes and 6 edges
- 4 nodes and 6 edges

