Computational Thinking

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Computational Thinking

Tutorial on pseudocode for recursion and Depth First Search (DFS)

Content

Recursion

- Recursion is a process in which a procedure calls itself.
- All problems can not be solved using recursion.
- Only those problems which have a base condition can be solved using recursion.
- Recursion simplifies the pseudocode.

Pseudocode to find the factorial of a number

```
Procedure factorial (n)
    fact = 1
    while (n > 0) {
        fact = fact * n
        n = n - 1
    }
    return (fact)
End factorial
```

Pseudocode to find the factorial of a number

```
Procedure factorial (n)
    fact = 1
    while (n > 0) {
        fact = fact * n
        n = n - 1
    }
    return (fact)
End factorial
```

```
Procedure factorial (n)
    if (n == 0) {
        return (1)
    }
    else {
        return (n * factorial (n - 1))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (n)
    if (n == 0) {
        return (1)
    }
    else {
        return (n * factorial (n - 1))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
        if (5 == 0) {
                return (1)
        }
        else {
                return (5 * factorial (5 - 1))
        }
End factorial
```

```
Procedure factorial (4)
        if (4 == 0) {
                return (1)
        }
        else {
                return (4 * factorial (4 - 1))
        }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * factorial (4 - 1))
    }
End factorial
```

```
Procedure factorial (3)
    if (3 == 0) {
        return (1)
    }
    else {
        return (3 * factorial (3 - 1))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * factorial (4 - 1))
    }
End factorial
```

```
Procedure factorial (3)
    if (3 == 0) {
        return (1)
    }
    else {
        return (3 * factorial (3 - 1))
    }
End factorial
```

```
Procedure factorial (2)
    if (2 == 0) {
        return (1)
    }
    else {
        return (2 * factorial (2 - 1))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * factorial (4 - 1))
    }
End factorial
```

```
Procedure factorial (3)
    if (3 == 0) {
        return (1)
    }
    else {
        return (3 * factorial (3 - 1))
    }
End factorial
```

```
Procedure factorial (2)
    if (2 == 0) {
        return (1)
    }
    else {
        return (2 * factorial (2 - 1))
    }
End factorial
```

```
Procedure factorial (1)
    if (1 == 0) {
        return (1)
    }
    else {
        return (1 * factorial (1 - 1))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * factorial (4 - 1))
    }
End factorial
```

```
Procedure factorial (3)
    if (3 == 0) {
        return (1)
    }
    else {
        return (3 * factorial (3 - 1))
    }
End factorial
```

```
Procedure factorial (2)
    if (2 == 0) {
        return (1)
    }
    else {
        return (2 * factorial (2 - 1))
    }
End factorial
```

```
Procedure factorial (1)
    if (1 == 0) {
        return (1)
    }
    else {
        return (1 * factorial (1 - 1))
    }
End factorial
```

```
Procedure factorial (0)
    if (0 == 0) {
        return (1)
    }
    else {
        return (0 * factorial (0 - 1))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * factorial (4 - 1))
    }
End factorial
```

```
Procedure factorial (3)
    if (3 == 0) {
        return (1)
    }
    else {
        return (3 * factorial (3 - 1))
    }
End factorial
```

```
Procedure factorial (2)
    if (2 == 0) {
        return (1)
    }
    else {
        return (2 * factorial (2 - 1))
    }
End factorial
```

```
Procedure factorial (1)
    if (1 == 0) {
        return (1)
    }
    else {
        return (1 * 1)
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * factorial (4 - 1))
    }
End factorial
```

```
Procedure factorial (3)
    if (3 == 0) {
        return (1)
    }
    else {
        return (3 * factorial (3 - 1))
    }
End factorial
```

```
Procedure factorial (2)
    if (2 == 0) {
        return (1)
    }
    else {
        return (2 * 1)
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * factorial (4 - 1))
    }
End factorial
```

```
Procedure factorial (3)
    if (3 == 0) {
        return (1)
    }
    else {
        return (3 * 2)
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

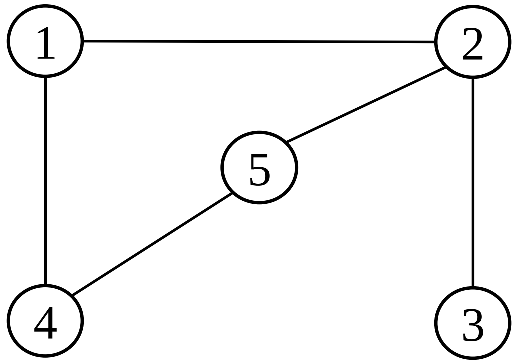
```
Procedure factorial (5)
    if (5 == 0) {
        return (1)
    }
    else {
        return (5 * factorial (5 - 1))
    }
End factorial
```

```
Procedure factorial (4)
    if (4 == 0) {
        return (1)
    }
    else {
        return (4 * 6))
    }
End factorial
```

Pseudocode to find the factorial using recursion (n = 5)

```
Procedure factorial (5)
        if (5 == 0) {
                return (1)
        }
        else {
                return (5 * 24)
        }
End factorial
```

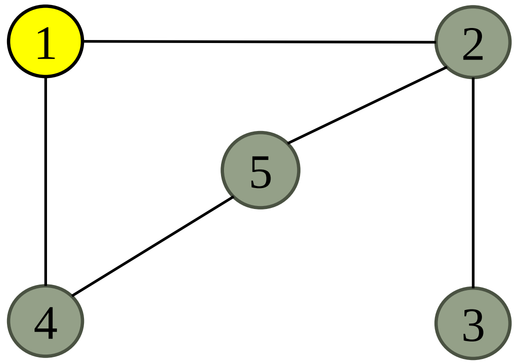
Depth First Search (DFS)



Input graph

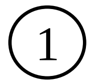
Starting vertex = 1

Depth First Search (DFS)

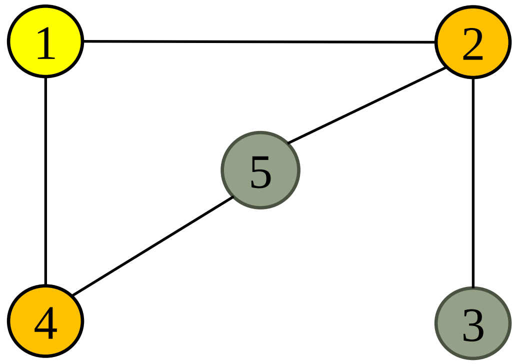


Input graph

Current vertex = 1



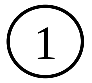
Depth First Search (DFS)



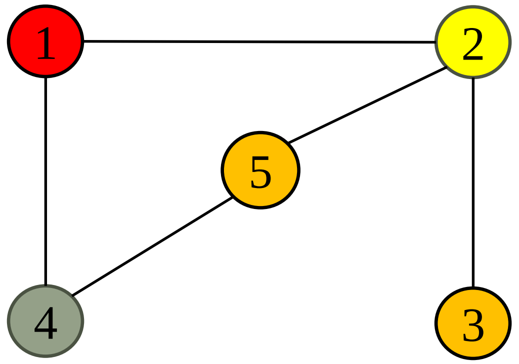
Input graph

Current vertex = 1

Neighbour = 2, 4



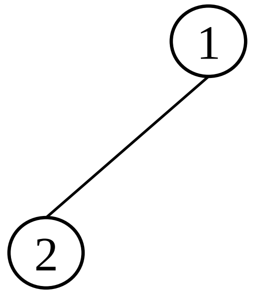
Depth First Search (DFS)



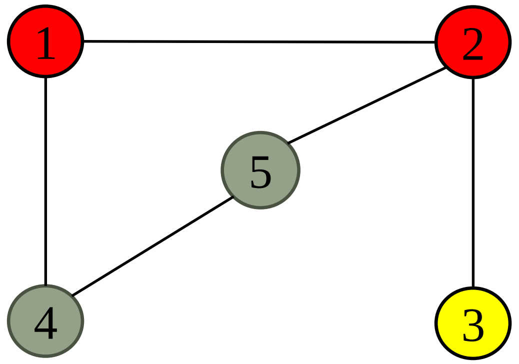
Input graph

Current vertex = 2

Neighbour = 3, 5



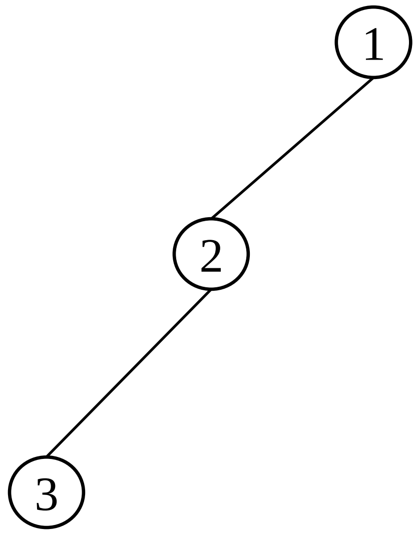
Depth First Search (DFS)



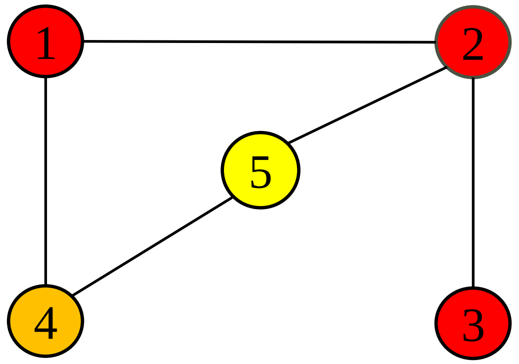
Input graph

Current vertex = 1

Neighbour = No



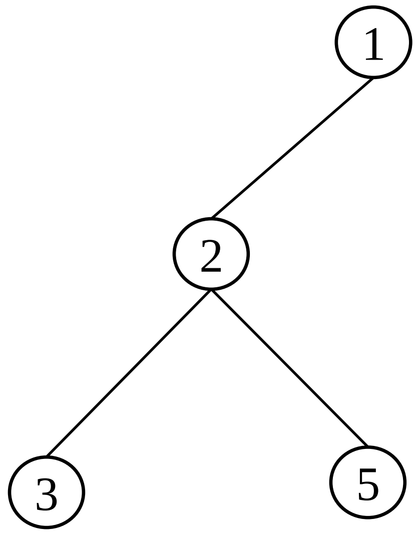
Depth First Search (DFS)



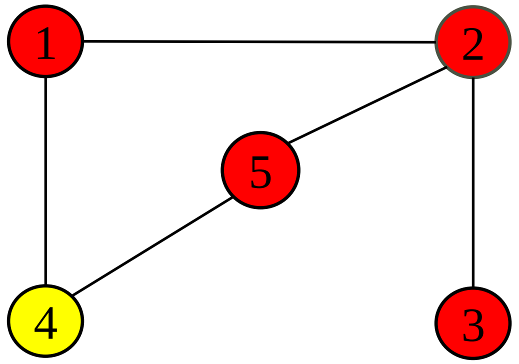
Input graph

Current vertex = 5

Neighbour = 4



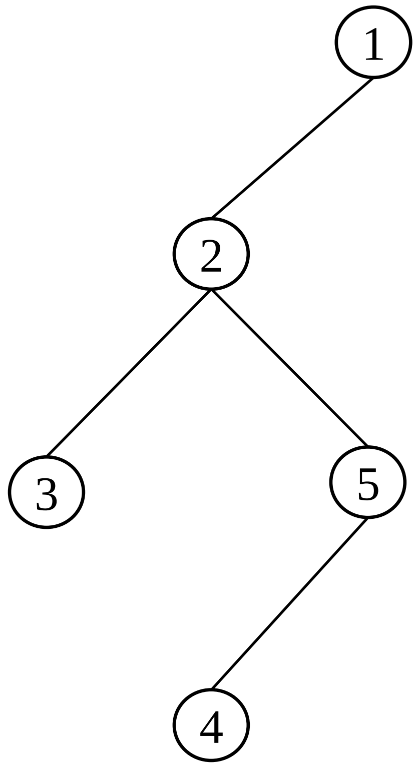
Depth First Search (DFS)



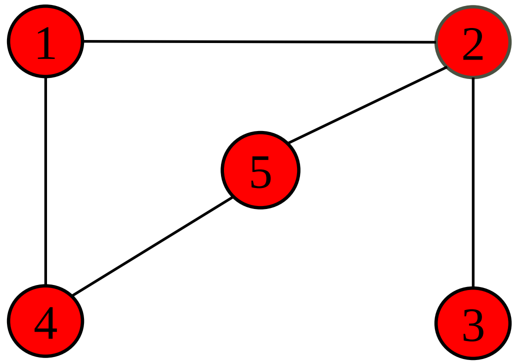
Input graph

Current vertex = 4

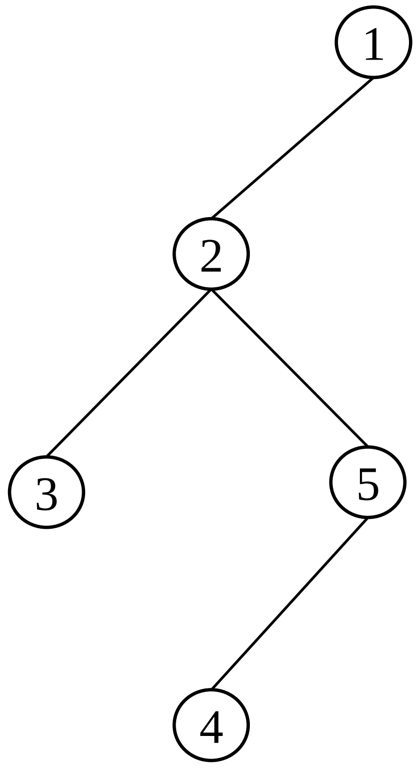
Neighbour = No



Depth First Search (DFS)



Input graph



Output DFS tree