

# PADOVAN SEQUENCE

ALGORITHMIC PROBLEM SOLVING

17ECSE309

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The Padovan sequence is named after Richard Padovan.

## **What is Padovan Sequence?**

It is a sequence of integers with initial values

$$P(1) = P(2) = P(3) = 1$$

and recurrence relation

$$P(n) = P(n-2) + P(n-3)$$

The first few values of the sequence are

**1,1,1,2,2,3,4,5,7,9,12,16,21.....**

Sum to m terms:

$$\sum_{m=0}^n P(m) = P(n+5) - 2.$$

The sequence also satisfies the identity

$$P(n)^2 - P(n+1)P(n-1) = P(-n-7)$$

**Perrin Sequence** too has the same recurrence relation as that of Padovan Sequence but the only difference is its initial values.

$$P(0) = 3, P(1) = 0, P(2) = 1$$

# Pseudo Code

```
padovan(int n){  
    int a[n];  
    a[0] = a[1] = a[2] = 1;  
    for(int i = 3; i < n; i++){  
        a[i] = a[i-2]+a[i-3];  
    }  
}
```

# Time and Space Complexity

## Time complexity:

Recursive :  $O(2^n) \rightarrow T(n) = T(n-2) + T(n-3)$ . In each step T gets called twice.

Iterative :  $O(n)$

## Space complexity:

Recursive :  $O(n) \rightarrow$  Stack calls.

Iterative :  $O(1) \rightarrow$  Here every function call is done with calculations .  
So here there is only one stack item at any instance. And only one time it return the value which is at the end.

# Applications

1. Padovan Matrix<sup>[3]</sup>
2. The Padovan Sequence in Menorca<sup>[4]</sup>

# References/Bibliography

1. [https://en.wikipedia.org/wiki/Padovan\\_sequence](https://en.wikipedia.org/wiki/Padovan_sequence)
2. <https://www.geeksforgeeks.org/padovan-sequence/>
3. [https://www.researchgate.net/publication/267677035 Some Properties of Padovan Sequence by Matrix Methods](https://www.researchgate.net/publication/267677035_Some_Properties_of_Padovan_Sequence_by_Matrix_Methods)
4. <https://thematheoreticaltourist.wordpress.com/2015/05/25/the-padovan-sequence-in-menorca/>