• Piecewise Recurrence Relation

Based on the following piecewise recurrence relation:

F(n) = F(n-) + F(n-2), where F(0) = 0, F(1) = 1, F(2) = 2.

This program generates the output of the relation for any integer non-negative value of **n** using different 3 ways as follows:

1. Using Function Recursion.
2. Using Dynamic Programming.
3. Using Space Optimization.

• Advantages and disadvantages

	Advantages	**Disadvantages**
Function Recursion	- Reduce unnecessary calling of functions. - Simplify the implement of big problem instead of iterative solution that is very complex.	- Recursion is always logical and difficult to trace and debug. - Recursion uses more processor time. - Time complexity is exponential. - Recursion must have base condition to avoid infinite loop. - Auxiliary space O(n).
Dynamic Programming	- Saves time from calculating same values more than a time. - Save time on writing and compiling the code. - Time complexity O(n).	- Runtime errors risk. - Need runtime auxiliary space O(n).
Space Optimized	- This solution optimizes dynamic programming solution. - uses only four variables and switch between them that saves space and time. - Time complexity O(n). - Space Complexity O(1).	