

Answer: 2(a)

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Implementation 01:

$$\begin{aligned} T(n) &= T(n-1) + T(n-2) + C \\ &= 2T(n-2) + C \end{aligned}$$

Here,

$$T(n-1) \approx T(n-2)$$

$$= 2(2T(n-2) + C) + C$$

$$= 4T(n-2) + 3C$$

$$= 8T(n-3) + 7C$$

$$T(n) = 2^k T(n-k) + (2^k - 1)C$$

if we assume,  $n-k=0$ 

$$\Rightarrow n=k$$

$$\text{So, } T(n) = 2^n C - C$$

$$= 2^n$$

$\therefore$  The time complexity will be  $O(2^n)$

Implementation 02

$$T(n) = n - 2$$

$$\text{So, } T(n) = n$$

So, time complexity will be  $O(n)$

Now, here we can see the first implementation is  $O(2^n)$  and the second implementation is  $O(n)$ . So we can say the second implementation will take shorter period of time than the first one. So, the second implementation is much faster than the first implementation.