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## Practica 12

Buttom up



```
main.py
1 def fibonacci_bottom_up(n):
2     if n == 0:
3         return 0
4     if n == 1:
5         return 1
6
7     f = [0, 1]
8
9     for i in range(2, n + 1):
10        f.append(f[i - 1] + f[i - 2])
11
12    return f[n]
13
14 if __name__ == "__main__":
15     num = 10
16     print(f"Fibonacci Bottom-Up de {num} =", fibonacci_bottom_up(num))
17
18
```

Fibonacci Bottom-Up de 10 = 55

...Program finished with exit code 0  
Press ENTER to exit console.█

## Top down

```
main.py
1 memoria = {}
2
3 def fibonacci_top_down(n):
4     if n in memoria:
5         return memoria[n]
6
7     if n == 0:
8         memoria[0] = 0
9         return 0
10    if n == 1:
11        memoria[1] = 1
12        return 1
13
14    valor = fibonacci_top_down(n - 1) + fibonacci_top_down(n - 2)
15    memoria[n] = valor
16    return valor
17
18
19 if __name__ == "__main__":
20     num = 10
21     print(F"Fibonacci Top-Down de {num} =", fibonacci_top_down(num))
22     print("Memoria usada:", memoria)
23

Fibonacci Top-Down de 10 = 55
Memoria usada: {1: 1, 0: 0, 2: 1, 3: 2, 4: 3, 5: 5, 6: 8, 7: 13, 8: 21, 9: 34, 10: 55}

...Program finished with exit code 0
Press ENTER to exit console.[]
```

## Divide & Conquer



The screenshot shows a terminal window with a dark background and light-colored text. At the top, there's a title bar with the file name "main.py". The main area contains the Python code for Quicksort, with line numbers from 1 to 25 on the left. Lines 21 through 25 are part of the main block, demonstrating how the function is called with a specific list of integers.

```
main.py
1 def quicksort(lista):
2     if len(lista) <= 1:
3         return lista
4
5     pivot = lista[len(lista) // 2]
6     menores = []
7     iguales = []
8     mayores = []
9
10    for x in lista:
11        if x < pivot:
12            menores.append(x)
13        elif x == pivot:
14            iguales.append(x)
15        else:
16            mayores.append(x)
17
18    return quicksort(menores) + iguales + quicksort(mayores)
19
20
21 if __name__ == "__main__":
22     datos = [5, 2, 9, 1, 7, 3]
23     print("Lista original:", datos)
24     print("Lista ordenada (QuickSort):", quicksort(datos))
25
```

Below the code, the terminal output is displayed:

```
Lista original: [5, 2, 9, 1, 7, 3]
Lista ordenada (QuickSort): [1, 2, 3, 5, 7, 9]

...Program finished with exit code 0
Press ENTER to exit console.[]
```