**Ejercicio 10**

$$T(n) = \begin{cases} 2, n = 1 \\ T(n-1) + n, n \geq 2 \end{cases}$$

Buscamos un paso general

P1 = T(n-1) + n

P2 = T(n-2) + 2n

P3 = T(n-3) + 3n

Pi = T(n-i) + in

Buscamos caso base

n-i = 2
n = 2 + i
n - 2 = i

Reemplazamos por el caso base

$P_{n-2}$ = T(n-(n-2)) + (n-2)n

    = 2 + $n^2$ n-2

    = $O(n^2)$

$$T(n) = \begin{cases} 2, n = 1 \\ T(n-1) + \dfrac{n}{2}, n \geq 2 \end{cases}$$

Completar

$$T(n) = \begin{cases} 1 & n = 1 \\ 2T\left(\dfrac{n}{4}\right) + \sqrt{n}, & n \geq 2 \end{cases}$$

Completar

$$T(n) = \begin{cases} 1, n = 1 \\ 4T\left(\dfrac{n}{2}\right) + n^2, n \geq 2 \end{cases}$$

Buscamos un paso general

P1 = $4T(\frac{n}{2}) + n^2$

P2 = $4[4t(\frac{n}{2}/2) + (\frac{n}{2})^2] + n^2 = 16T(\frac{n}{4}) + 4(\frac{n}{2})^2 + n^2 = 16T(\frac{n}{4}) + 2n^2$

P3 = $16[4t(\frac{n}{4}/2) + (\frac{n}{4})^2] + 2n^2 = 64T(\frac{n}{8}) + 16(\frac{n}{4})^2 + 2n^2 = 64T(\frac{n}{8}) + 3n^2$

Pi = $4^iT(\frac{n}{2^i}) + in^2$

Reemplazar por el caso base

$\frac{n}{2^i} = 1 \; (2^1 = 2i)$

n = $2^i$

$\log_2(n) = \log_2(i)$

i = $\log_2(n)$

$4^{\log2(n)} T(\frac{n}{2}^{\wedge}(log2(n)) + log2(n) \, n^2 = 4^{\wedge}(log2(n)) \, n^2 = (2^2)^{\wedge}(log2(n)) = (2^{\wedge}(log2(n))^2 = n^2 + \log_2(n) \, n^2 = O(\log_2(n) \, n^2$