

LISTA 2 ZAL

LUCAS EDUARDO ROSA DE FACITAS

QUESTÃO 1)

O arranjo do ret fica assim após a chamada:
 $\{8, 7, 5, 3, 6, 1, 4, 2\}$

A complexidade de tempo será $O(m \log m)$.
E a complexidade de espaço será $O(1)$.

QUESTÃO 2.

b) $T(m) = 2T(m-1) + m$

$T(1) = 1$

$$T(4) = 2T(3) + 4$$

$$2T(3) = 2^2T(2) + 2^3$$

$$2^2T(2) = 2^3T(1) + 2^2$$

$$T(4) = 2^3 + 2^2 + 4$$

$$T(m) = 2T(m-1) + m$$

$$2T(m-1) = 2T((m-1)2) + 2(m-1)$$

$$2^2T((m-1)2) = 2^3T((m-1)3) + 2^2(m-1)2$$

$$2^{l-1}T((m-1)l-1) = 2T((m-1)l) + 2^{l-1}(m-1)l-1$$

$$* m-1 = 1 * m = 2$$

$$T(m) = m + (m-1) + 2(m-1)2 + \dots + 2^{l-1}(m-1)l-1 + 2^l T((1)2)$$

$$T(m) = 2 + m + \sum_{i=0}^{l-1} 2^i (m-1) i - 1$$

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QUESTÃO 2.

b)

$$T(m) = T(m/2) + \log_2 m$$

$$T(1) = 1$$

$$T(8) = T(4) + 3$$

$$T(4) = T(2) + 2$$

$$T(2) = T(1) + 1$$

$$T(8) = 1 + 2 + 3$$

$$T(m) = T(m/2) + \log_2 m$$

$$T(m/2) = T(m/2^2) + \log_2 m/2$$

:

$$T(m/2^{l-1}) = T(m/2^l) + \log_2 m/2^{l-1}$$

$$m/2^l = 1 \quad * \quad m = 2^l \quad * \quad m = \log m$$

$$T(m) = \log_2 m + \log_2 m/2 + \log_2 m/2^2 + \log_2 m/2^{l-1} + 1$$

$$T(m) = 1 + \sum_{i=0}^l \log_2 m/2^i$$

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QUESTÃO 2.

$$c) T(m) = 4T(m/2) + m$$

$$T(1) = 1$$

$$\left. \begin{array}{l} T(m) = 4T(m/2) + m \\ T(1) = 1 \end{array} \right\}$$

$$T(8) = 4 + (4) + 8$$

$$4T(4) = 4^2T(2) + 4$$

$$4^2T(2) = 4^3T(1) + 4^2$$

$$T(8) = 8 \cdot 4 + 4 \cdot 2^2 + 4 \cdot 1^2$$

$$T(m) = 4T(m/2) + m$$

$$4T(m/2) = 4T(m/2^2) + 2m$$

$$4^2T(m/2^2) = 4^2T(m/2^3) + 4m$$

$$4^{l-1}T(m/2^{l-1}) = 4^{l-1}T(m/2^l) + 2^{l-1}m$$

$$* m/2^l = 1 \quad * m = 2^l \quad * m = \log m$$

$$T(m) = m + 2m + 4m + \dots + 2^{l-1}m + 4^{l-1}$$

$$T(m) = 4^l + \sum_{i=0}^{l-1} 2^i \cdot m$$

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QUESTÃO 2)

$$a) T(m) = T(m/2) + m$$

$$T(1) = 1$$

$$T(8) = T(4) + 8$$

$$T(4) = T(2) + 4$$

$$T(2) = T(1) + 2$$

$$T(1) = T(1/2) + 1$$

$$T(8) = 8 + 4 + 2 + 1$$

$$T(8) = 15$$

Fórmula fechada.

$$T(m) = T(m/2) + m$$

$$T(m/2) = T(m/2^2) + \frac{m}{2}$$

$$T(m/2^2) = T(m/2^3) + \frac{m}{2^2}$$

$$T(m/2^{l-1}) = T(m/2^l) + m/2^{l-1} - 1$$

$$T(m) = m + \frac{m}{2} + \frac{m}{2^2} + \dots + m/2^{l-1} - 1 + 1$$

$$T(m) = 1 + \sum_{i=0}^{l-1} m/2^i$$

$$* \frac{m}{2^l} = 1 \quad * m = 2^l \quad * m = \log m$$