9) a) 1. while:

paso 1 $c = 1$

paso 2 $c = 2 \cdot 1$

paso 3 $c = 2^2 \cdot 1$

paso i $c = 2^{i-1} \cdot 1$

$2^{i-1} < n$

$i-1 < \log_2(n)$

$i < \log_2(n) + 1$

$$T(n) = c_1 + \sum_{i=1}^{\log_2(n)} c_2 = c_1 + \log_2(n) \cdot c_2$$

b)

$T(n)$ es de $O(\log_2(n))$

$$\left.\begin{array}{l} c_1 \leq \log_2(n) \\ c_1 \leq c_1 \cdot \log_2(n) \end{array}\right\} \begin{array}{l} c = c_1 \\ n_0 = 1 \end{array} \qquad \left.\begin{array}{l} \log_2(n) \leq \log_2(n) \\ \log_2(n) \cdot c_2 \leq \log_2(n)^{c_2} \end{array}\right\} \begin{array}{l} c = c_2 \\ n_0 = 1 \end{array}$$

$T(n) \leq \log_2(n) \cdot c_1 + \log_2(n) \cdot c_2$

$T(n) \leq \log_2(n) \cdot (c_1 + c_2)$

$T(n) \leq \log_2(n) \cdot c$

$T(n) \leq \log_2(n)$, con $c = (c_1 + c_2)$, $\forall\, n \geq n_0$ con $n_0 = 1$

m

a) 2.

paso 1 $c = n$

paso 2 $c = \frac{n}{2}$

paso 3 $c = \frac{n}{3/2}$

paso i $c = \frac{n}{2^{i-1}}$

$\frac{n}{2^{i-1}} > 1$

$n > 2^{i-1}$

$\log_2(n) > i-1$

$i-1 < \log_2(n)$

$i < \log_2(n)+1$

b)

$c_1 + \sum_{i=1}^{\log_2(n)} c_2 = c_1 + \log_2(n) \cdot c_2$ | tiene $O(\log_2(n))$

$\left.\begin{array}{l} c_1 \leq \log_2(n) \\ c_1 \leq \log_2(n) \cdot c_1 \end{array}\right\}$ $c = c_1$, $n_0 = 1$

$T(n) \leq \log_2(n) \cdot (c_1 + c_2)$

$T(n) \leq \log_2(n) \cdot c$

$\left.\begin{array}{l} \log_2(n) \leq \log_2(n) \\ \log_2(n) \cdot c_2 \leq \log_2(n) \cdot c_2 \end{array}\right\}$ $c = c_2$, $n_0 = 1$

$T(n) \leq O(n)$ con $c = (c_1 + c_2)$, $\forall\, n > n_0$, $n_0 = 1$