Apa - 28/03/2025 Phillipi Jesus Cardoso

a) $n - 100 \leq c(n - 200)$

$$\frac{n-100}{n-200} \leq c$$

$$\lim_{n \to \infty} \frac{n-100}{n-100} = \lim_{n \to \infty} \frac{1 - \frac{100}{n}}{1 - \frac{200}{n}} = \frac{1}{1} = 1 \leq c$$

Para $c = 2$

$$\frac{n-100}{n-200} \leq 2$$

$n - 100 \leq 2(n - 100)$

$n - 100 \leq 2n - 100$

$-100 + 100 \leq 2n - n$

$300 \leq n$

$f(n - 100) = O(g(n - 200))$ com $c = 2$ e $n_0 = 300$

b) $n^{\frac{1}{2}} \leq c n^{\frac{2}{3}}$

$$\frac{n^{\frac{1}{2}}}{n^{2/3}} \leq c$$

$n^{\frac{1}{2} - \frac{2}{3}} \leq c$

$n^{\frac{3-4}{6}} \leq c$

$n^{\frac{-1}{6}} \leq c$

$$\sqrt[6]{\frac{1}{n}}$$

Para $c = 1$ e $n_0 = 1n^{\frac{1}{3}}$ e

$O(n^{\frac{1}{3}}$

$n^{\frac{1}{2}}$ é $O(n^{\frac{2}{3}})$

c) $100n + \log n \leq C((n + (\log n)^2)$

$\log n$ cresce menos que $100n$ logo $100n$ é o termo dominante, já n também cresce mais que $(\log n)^2$

$100n \; \log n \leq c((n + (\log n)^2))$

$$\frac{100n \; \log n}{n} \leq c \; n + \frac{(\log n)^2}{n}$$

$$\lim_{n \to \infty} \left(100 + \frac{\log n}{n}\right) \leq c \left(1 + \frac{(\log n)^2}{n}\right) \lim_{n \to \infty}$$

$100 + 0 \leq c \; 1 + 0$

$100 \leq c$

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