Universidade Federal de Ouro Preto
Departamento de Computação - DECOM
BCC241 – Projeto e Análise de Algoritmos
Prof. Anderson Almeida Ferreira
Exercícios – Análise Assintótica

Turma: 11
Nome: Pedro Lucas Damasceno Silva
Matrícula: 20.1.4003

1. f(n) = n-100; g(n) = n-200

$$\lim_{n\to\infty}\left(\frac{n-100}{n-200}\right) = 1$$

f(n) = O(g(n)); f(n) = Ω(g(n)); f(n) = Θ(g(n)); f(n) ≠ o(g(n)); f(n) ≠ ω(g(n))

2. f(n) = log n; g(n) = $(\log n)^2$

$$\lim_{n\to\infty}\left(\frac{\log n}{(\log n)^2}\right) = 0$$

f(n) = O(g(n)); f(n) ≠ Ω(g(n)); f(n) ≠ Θ(g(n)); f(n) = o(g(n)); f(n) ≠ ω(g(n))

3. f(n) = log n; g(n) = log n^2

$$\lim_{n\to\infty}\left(\frac{\log n}{\log n^2}\right) = \lim_{n\to\infty}\left(\frac{\log n}{2(\log n)}\right) = \frac{1}{2}$$

f(n) = O(g(n)); f(n) = Ω(g(n)); f(n) = Θ(g(n)); f(n) ≠ o(g(n)); f(n) ≠ ω(g(n))

4. f(n) = 2^n; g(n) = 2^{n+1}

$$\lim_{n\to\infty}\left(\frac{2^n}{2^{n+1}}\right) = \lim_{n\to\infty}\left(\frac{2^n}{2^n.2}\right) = \frac{1}{2}$$

f(n) = O(g(n)); f(n) = Ω(g(n)); f(n) = Θ(g(n)); f(n) ≠ o(g(n)); f(n) ≠ ω(g(n))

5. f(n) = n!; g(n) = 2^n

$$\lim_{n\to\infty}\left(\frac{n!}{2^n}\right) = \infty$$

f(n) ≠ O(g(n)), pois ∀n≥m, ∄c | n! ≤ c . 2^n
f(n) = Ω(g(n)), pois ∀n≥m, 4 . n! ≥ 2^n
f(n) ≠ O(g(n)); f(n) = Ω(g(n)); f(n) ≠ Θ(g(n)); f(n) ≠ o(g(n)); f(n) = ω(g(n))

6. f(n) = $2n^2 + 5n$; g(n) = n^2

$$\lim_{n\to\infty}\left(\frac{2n^2+5n}{n^2}\right) = \lim_{n\to\infty}\left(2+\frac{5}{n}\right) = 2$$

f(n) = O(g(n)); f(n) = Ω(g(n)); f(n) = Θ(g(n)); f(n) ≠ o(g(n)); f(n) ≠ ω(g(n))

7. $f(n) = 2n^2 + 5n; g(n) = n^3$

$$\lim_{x \to \infty}\left(\frac{2n^2+5n}{n^3}\right) = \lim_{x \to \infty}\left(\frac{2n+5}{n^2}\right) = 0$$

$f(n) = O(g(n)); f(n) = \Omega(g(n)); f(n) = \Theta(g(n)); f(n) = o(g(n)); f(n) \neq \omega(g(n))$