A regra de L'Hôpital

[08] Calcule os limites indicados abaixo.

(a) $\lim\limits_{x\to 1} \dfrac{x^{64}-1}{x^{32}-1}$,

(c) $\lim\limits_{x\to(\pi/2)^+} \dfrac{\cos(x)}{1-\operatorname{sen}(x)}$,

(e) $\lim\limits_{t\to 0} \dfrac{e^{3t}-1}{t}$,

(g) $\lim\limits_{\theta\to\pi/2} \dfrac{1-\operatorname{sen}(\theta)}{\operatorname{cossec}(\theta)}$,

(i) $\lim\limits_{x\to\infty} \dfrac{\ln(x)}{x}$,

(k) $\lim\limits_{x\to\infty} \dfrac{\ln(\ln(x))}{x}$,

(m) $\lim\limits_{x\to 1} \dfrac{\ln(x)}{\operatorname{sen}(\pi x)}$,

(o) $\lim\limits_{x\to 0} \dfrac{\operatorname{arcsen}(x)}{x}$,

(r) $\lim\limits_{x\to 0^+} (\sqrt{x}\,\ln(x))$,

(t) $\lim\limits_{x\to 0}(\operatorname{cotg}(2x)\operatorname{sen}(6x))$

(v) $\lim\limits_{x\to\infty} (x\operatorname{tg}(1/x))$,

(y) $\lim\limits_{x\to\infty} (x^2-x)$,

(b) $\lim\limits_{x\to 0} \dfrac{x+\operatorname{tg}(x)}{\operatorname{sen}(x)}$,

(d) $\lim\limits_{t\to 0} \dfrac{e^t-1}{t^3}$,

(f) $\lim\limits_{x\to 0} \dfrac{\operatorname{tg}(64x)}{\operatorname{tg}(32x)}$,

(h) $\lim\limits_{x\to\infty} \dfrac{e^x}{x}$,

(j) $\lim\limits_{x\to 0^+} \dfrac{\ln(x)}{x}$,

(l) $\lim\limits_{t\to 0} \dfrac{5^t-3^t}{t}$,

(n) $\lim\limits_{x\to 0} \dfrac{\operatorname{sen}(x)}{\operatorname{senh}(x)}$,

(p) $\lim\limits_{x\to 0} \dfrac{x+\operatorname{sen}(x)}{x+\cos(x)}$,

(s) $\lim\limits_{x\to-\infty} (x^2 e^x)$,

(u) $\lim\limits_{x\to 0^-} (\operatorname{sen}(x)\ln(x))$,

(w) $\lim\limits_{x\to 0}(\operatorname{cossec}(x)-\operatorname{cotg}(x))$,

(z) $\lim\limits_{x\to\infty} (x-\ln(x))$.

[09] Calcule os limites indicados abaixo.

(a) $\lim\limits_{x\to 0^+} x^{(x^2)}$,

(b) $\lim\limits_{x\to 0}(1-2x)^{1/x}$,

(e) $\lim\limits_{x\to\infty} (e^x+x)^{1/x}$,

(c) $\lim\limits_{x\to\infty} (1+3/x+5/x^2)^x$,

(d) $\lim\limits_{x\to\infty} x^{\ln(2)/(1+\ln(x))}$,

(f) $\lim\limits_{x\to 0^+} (\cos(x))^{1/x^2}$.

[10] Seja f uma função de classe C^2. Calcule

$$\lim_{h\to 0} \frac{f(p+h)-2f(p)+f(p-h)}{h^2}.$$

Dica: use a regra de L'Hôpital.

Respostas

[08] (a) 2, (b) 2, (c) $-\infty$, (d) $+\infty$, (e) 3, (f) 2, (g) 0, (h) $+\infty$, (i) 0, (j) $-\infty$, (k) 0, (l) $\ln(5/3)$, (m) $-1/\pi$, (n) 1, (o) 1, (p) 0, (r) 0, (s) 0, (t) 3, (u) 0, (v) 1, (w) 0, (y) $+\infty$, (z) $+\infty$.

[09] (a) 1, (b) e^{-2}, (c) e^3, (d) 2, (e) e, (f) $1/\sqrt{e}$.

[10] $f''(p)$.