

Vypočtěte limity l'Hospitalovým pravidlem (pokud nelze pravidlo použít, určete je jinak)

- (a)  $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - 3x + 2}$  (b)  $\lim_{x \rightarrow 3} \frac{x^2 - 4}{x^2 - 3x + 2}$  (c)  $\lim_{x \rightarrow +\infty} \frac{x^2 - 4}{x^2 - 3x + 2}$   
 (d)  $\lim_{x \rightarrow 1} \frac{x^3 - 4x^2 + 5x - 2}{x^5 - 3x + 2}$  (e)  ~~$\lim_{x \rightarrow 0} \frac{\sin x \cos x}{\sin 2x - \cos x}$~~  (f)  ~~$\lim_{x \rightarrow 0} \frac{(1+3x)^4 - 1}{x^2}$~~   
 (g)  $\lim_{x \rightarrow 0} \frac{\sqrt{2+x} - \sqrt{2}}{x}$  (h)  $\lim_{x \rightarrow -2} \frac{\sqrt{6+x} - 2}{x+2}$  (i)  $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{\sqrt{x^3} - 8}$   
 (j)  $\lim_{x \rightarrow 1} \frac{x^{\frac{2}{3}} - 1}{x^{\frac{3}{5}} - 1}$  (k)  $\lim_{x \rightarrow 0} \frac{\sqrt[4]{1+x} - 1}{x}$  (l)  $\lim_{x \rightarrow 0} \frac{\arcsin x}{x}$   
 (m)  $\lim_{x \rightarrow 0} \frac{e^{x^2} - 1}{\cos x - 1}$  (n)  ~~$\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \sin x \cos x}{\sin 2x - \cos x}$~~  (o)  $\lim_{x \rightarrow 0} \frac{x - \operatorname{arctg} x}{x^3}$   
 (p)  $\lim_{x \rightarrow +\infty} \frac{\ln x}{\sqrt{x}}$  (q)  $\lim_{x \rightarrow +\infty} \frac{e^x}{x^3}$  (r)  $\lim_{x \rightarrow 1} \frac{x-1}{\ln x}$   
 (s)  ~~$\lim_{x \rightarrow 0} \frac{\ln x}{\ln(\sin x)}$~~  (t)  ~~$\lim_{x \rightarrow 0} \frac{\ln x}{x}$~~  (u)  ~~$\lim_{x \rightarrow 0} \frac{\ln x}{x}$~~

Řešení:

- (a) 4; (b)  $\frac{5}{2}$ ; (c) 1; (d) 0; (e)  $\frac{\pi}{m}$ ; (f)  $+\infty$ ; (g)  $\frac{\sqrt{2}}{4}$ ; (h)  $\frac{1}{4}$ ; (i)  $\frac{1}{12}$ ; (j)  $\frac{10}{9}$ ; (k)  $\frac{1}{4}$ ; (l) 1; (m) -2;  
 (n)  $+\infty$ ; (o)  $+\infty$ ; (p) 0; (q)  $+\infty$ ; (r) 1; (s) 1; (t) 1; (u) 1

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$$\lim_{x \rightarrow 0} \frac{x \sin x}{1 - \cos x} \quad [20] \qquad \lim_{x \rightarrow 0} \frac{e^{5x} - e^{-2x}}{3x} = \left[ \frac{7}{3} \right]$$

$$\lim_{x \rightarrow 0} \frac{\operatorname{arctg} x}{\arcsin x} \quad [1] \qquad \lim_{x \rightarrow 4} \frac{2\sqrt{x} - 4}{\sqrt{2x+1} - 3} \quad \left[ \frac{3}{2} \right]$$

$$\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2} \quad [1/2] \qquad \lim_{x \rightarrow 0} \frac{\sqrt{2x+4} - 2}{\operatorname{arctg} x + 2x} \quad \left[ \frac{1}{8} \right]$$

$$\lim_{x \rightarrow \infty} \frac{\ln^2 x}{x} \quad [0] \qquad \lim_{x \rightarrow 0} \frac{\sqrt{4x+9} - 3 + 2x}{\arcsin 3x - 5x^2} \quad \left[ \frac{8}{3} \right]$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2} \quad \left[ \frac{1}{2} \right]$$

$$\lim_{x \rightarrow 0} \frac{e^{2x} - e^{7x}}{x} \quad [-5] \qquad \lim_{x \rightarrow 1} \frac{\sqrt{10-x} - 3x}{2 \cdot \operatorname{arccotg}(3x-3) - \pi} \quad \left[ \frac{19}{36} \right]$$