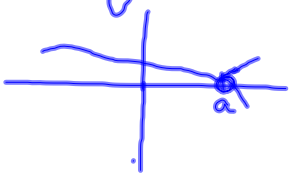
(44)

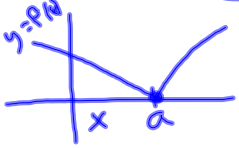
$\exists \lim_{x\to a}$

$f(x) > 0 \quad x < a$

(1) $\lim_{x\to a} f(x) > 0$

(2) $\lim_{x\to a} f(x) \geq 0$





ene 17-14:07

(45) $\lim_{x\to+\infty} [\ln(x+1) - \ln x] = 0$

$\lim_{x\to+\infty} \ln(x+1) - \ln x = \infty - \infty$

$\lim_{x\to+\infty} \ln\left(\frac{x+1}{x}\right) = \ln\left(\frac{\infty}{\infty}\right) = \ln 1 = 0$

$\lim_{x\to+\infty} x\,[\ln(x+1) - \ln(x)] = \infty(\infty-\infty)$

$\lim_{x\to+\infty} x \ln\left(\frac{x+1}{x}\right) = \infty \cdot 0$

$\ln f(x) \approx f(x) - 1$

$\lim_{x\to+\infty} x\left[\frac{x+1}{x} - 1\right] =$

$\lim_{x\to+\infty} x \frac{x+1-x}{x} = \lim \frac{x}{x} = 1$

ene 17-14:21

$y = 3x^3 - 4x + \sqrt{7}$

$y = 3 \cdot 3x^2 - 4 \cdot 1 + 0 = 9x^2 - 4$

$y = 2^x + x^2 + 2x + \log_2 x$

$y' = 2^x \ln 2 + 2x + 2 \cdot 1 + \frac{1}{x \ln 2}$

$y = \sin x \cdot e^x$

$y' = \cos x \cdot e^x + \sin x \cdot e^x =$

$e^x(\cos x + \sin x)$

$y = \frac{x^3 + 2x}{x^2 - 1}$

$y' = \frac{(3x^2+2)(x^2-1) - (x^3+2x)(2x)}{(x^2-1)^2}$

$y' = \frac{3x^4 - 3x^2 + 2x^2 - 2 - 2x^4 - 4x^2}{(x^2-1)^2}$

$y' = \frac{x^4 - 5x^2 - 2}{(x^2-1)^2}$

ene 17-14:26

ene 17-14:31

$y = 2\operatorname{arctg} x + \frac{3}{x^3} + \frac{x^3}{3}$

$y' = 2\frac{1}{1+x^2} - \frac{9}{x^4} + \frac{1}{3}3x^2$

$y = \frac{3}{x^3}$ / $y' = \frac{0 \cdot x^3 - 3 \cdot 3x^2}{x^6} = \frac{-9}{x^4}$

$y = 3x^{-3}$ $y' = 3 \cdot (-3)x^{-4} = \frac{-9}{x^4}$

ene 17-14:31

$y = x$ $y' = 1$

$y = x^n$ $y' = n x^{n-1}$

$y = \sqrt{f(x)}$ $y' = \frac{1}{2\sqrt{f(x)}} \cdot f'(x)$

$y = \sqrt[n]{f(x)}$ $y' = \frac{1}{n\sqrt[n]{f(x)^{n-1}}} f'(x)$

$[f(g(x))]' = f'(g(x)) \cdot g'(x)$

$y = a^{f(x)}$ $y' = a^{f(x)} \cdot \ln a \cdot f'(x)$

ene 17-14:34

$y = (2x+3)^7$ $y' = 7(2x+3)^6 \cdot (2 \cdot 1 + 0)$

$14(2x+3)^6$

$y = 3 \cdot 2^{x^2+\sqrt{3}}$

$y' = 3 \cdot 2^{x^2+\sqrt{3}} \ln 2 \, (2x+0)$

$y' = 6x \cdot 2^{x^2+\sqrt{3}} \cdot \ln 2$

$y = 3\operatorname{sen}^2(3x+1) = 3[\operatorname{sen}(3x+1)]^2$

$y' = 3 \cdot 2\operatorname{sen}(3x+1) \cdot \cos(3x+1) \cdot 3$

$y' = 18 \operatorname{sen}(3x+1) \cdot \cos(3x+1)$

$2 \operatorname{sen} x \cos x = \operatorname{sen}(2x)$

$y' = 9 \operatorname{sen}(6x+2)$

ene 17-14:37

$$f(x) = \begin{cases} \frac{1}{x} & 0 \le x < 1 \\ \sqrt{x+1} & 1 \le x < 3 \\ x^2 - 3 & 3 < x < 5 \\ & 5 \le x \end{cases}$$

$f(0) = \lim_{x \to 0^+} f(x)$

f cont $[0, \infty) - \{0, 1, 3, 5\}$

En $x = 0$

$\lim_{x \to 0^+} f(x) = \lim_{x \to 0^+} \frac{1}{x} = \frac{1}{0^+} = +\infty$

$f(0) = \frac{1}{0}$ ∄

Dis Inf

• $f(x) = 2x + 3$ $(2, 5]$

ene 17-14:46