



$$\Delta y = f(x_0 + dx) - f(x_0)$$

$$dx = x_0 + dx - x_0 = dx$$

$$\text{tg}A = \Delta y / dx$$

$$\begin{aligned} \text{tg}B &= dy / dx \\ dy &= \text{tg}B * dx = \\ &= \text{tg}A * dx = \\ &= f'(x_0) dx \end{aligned}$$

A

$$dx \rightarrow 0 \quad \text{tg}A \rightarrow \text{tg}B$$

$$\begin{aligned} [f(x_0 + dx) - f(x_0)] / dx &\rightarrow ? \\ dx &\rightarrow 0 \end{aligned}$$

$y = \sin x$

$$f(x_0) = \sin(x_0)$$

$$f(x_0 + dx) = \sin(x_0 + dx)$$

$$\begin{aligned} f'(x_0) &= \lim_{dx \rightarrow 0} \{ [\sin(x_0 + dx) - \sin(x_0)] / dx \} = \lim_{dx \rightarrow 0} \{ [2 \sin((x_0 + dx) - x_0) / 2] \cos((x_0 + dx) + x_0) / 2] / dx \} = \\ &= \lim_{dx \rightarrow 0} \{ [2 \sin(dx/2) * \cos((2x_0 + dx)/2)] / dx \} = \lim_{dx \rightarrow 0} \{ [\sin(dx/2) * \cos((2x_0 + dx)/2)] / (dx/2) \} = \\ &= \lim_{dx \rightarrow 0} \{ \cos((2x_0 + dx)/2) \} = \cos((2x_0)/2) = \cos(x_0) \end{aligned}$$

$$\sin x - \sin y = 2 \sin((x - y) / 2) * \cos((x + y) / 2)$$

множеств \rightarrow бесконечные множества \rightarrow теория вещественных чисел \rightarrow теория пределов \rightarrow производные