

$$\frac{f(x) - f(x_0)}{x - x_0} = \frac{f(x_0 + h) - f(x_0)}{h}$$

$$f(x) = f(x_0 + h) = f(x_0) + f'(x_0)h + o(h)$$

$$\frac{f(x) - f(x_0)}{x - x_0} = \frac{f(x_0) + f'(x_0)h + o(h) - f(x_0)}{h} = f'(x_0) + \frac{o(h)}{h}$$

$$\lim_{h \rightarrow 0} \frac{o(h)}{h} = 0$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x) + f'(x)h + o(h) - f(x)}{h} = f'(x)$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x) + f'(x)h + o(h) - f(x)}{h} = f'(x)$$

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$$f(x) = \frac{1}{1 + (\frac{x}{2})^2} \cdot \frac{1}{2x} = \frac{1}{2x(1 + \frac{x^2}{4})}$$

$$f(x) = \cos \frac{x}{x+1} \cdot \tan 3x$$

$$f'(x) = (\cos \frac{x}{x+1})' \cdot \tan 3x + \cos \frac{x}{x+1} \cdot (\tan 3x)'$$

$$= (-\sin \frac{x}{x+1}) \cdot (\frac{(x+1) - x}{(x+1)^2}) \cdot \tan 3x + \cos \frac{x}{x+1} \cdot \frac{1}{\cos^2 3x} \cdot 3$$

$$f(x) = (2x)^{\cot x} = e^{\ln(2x) \cot x} = e^{\cot x \cdot \ln 2x}$$

$$f'(x) = (2x)^{\cot x} \cdot (\frac{1}{\sin^2 x} \ln 2x + \cot x \cdot \frac{1}{2x})$$

$$f(x) = \frac{1}{x^3} \sin x$$

$$f'(x) = -3x^{-4} \sin x + \frac{1}{x^3} \cos x$$

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$$f(x) = \frac{\tan x + 1}{\tan x - 1} = \frac{\frac{\sin x}{\cos x} + 1}{\frac{\sin x}{\cos x} - 1} = \frac{\sin x + \cos x}{\sin x - \cos x}$$

$$f'(x) = \frac{(\cos x - \sin x) - (\sin x + \cos x)}{(\sin x - \cos x)^2} = \frac{\cos x - \sin x - \sin x - \cos x}{(\sin x - \cos x)^2} = \frac{-2\sin x}{(\sin x - \cos x)^2}$$

$$f(x) = \sqrt{1 + \cos^2 x} = (1 + \cos^2 x)^{\frac{1}{2}}$$

$$f'(x) = \frac{1}{2} (1 + \cos^2 x)^{-\frac{1}{2}} \cdot 2\cos x \cdot (-\sin x) = \frac{-\cos x \sin x}{\sqrt{1 + \cos^2 x}}$$

$$3. f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} = \frac{e^{2x} - 1}{e^{2x} + 1}$$

$$f'(x) = \frac{2e^{2x} - 0}{(e^{2x} + 1)^2} = \frac{2e^{2x}}{(e^{2x} + 1)^2}$$

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$$f(x) = \ln \frac{(2x+1)^2}{\sqrt{2x+1}} = \ln \frac{(2x+1)^2}{(2x+1)^{\frac{1}{2}}} = \ln (2x+1)^{\frac{3}{2}}$$

$$f'(x) = \frac{3}{2} \cdot \frac{2}{2x+1} = \frac{3}{x+0.5}$$

$$f(x) = x^{2x} = e^{\ln x^{2x}} = e^{2x \ln x}$$

$$f'(x) = x^{2x} (2 \ln x + 2x \cdot \frac{1}{x}) = 2x^{2x} (\ln x + 1)$$

$$f(x) = x^{x^2} = e^{\ln x^{x^2}} = e^{x^2 \ln x}$$

$$f'(x) = x^{x^2} (2x \ln x + x^2 \cdot \frac{1}{x}) = x^{x^2} (2x \ln x + x)$$

$$(x^x)' = e^{x \ln x} \cdot (x \ln x)' = x^x (\ln x + 1)$$

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$$y = kx + q \quad [x_0, y_0]$$

$$y = f(x) = f(x_0) + f'(x_0)(x - x_0)$$

$$f(x) = f(x_0) + f'(x_0)(x - x_0)$$

$$f(x) = f(x_0) + f'(x_0)(x - x_0)$$

$$f(x) = \frac{2}{x^2} = 2x^{-2}$$

$$f'(x) = -4x^{-3} = -\frac{4}{x^3}$$

$$f'(2) = -\frac{4}{8} = -\frac{1}{2}$$

$$f(2) = \frac{2}{4} = \frac{1}{2}$$

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

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

$$2x - y - 2 = 0$$

$$n: 2x - y - 2 = 0$$

$$[2, \frac{1}{2}] \text{ en } y = -\frac{1}{2}x + 2$$

$$c = -2$$

$$\Rightarrow n: 2x - y - 2 = 0$$

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$$x^2 - 1 = 0 \quad T[1, 0]$$

$$x = \pm 1 \quad T[1, 0]$$

$$f(x) = 2x$$

$$f'(x) = 2$$

$$y = 0 + 2(x - 1)$$

$$y = 2x - 2$$

$$2x - y - 2 = 0$$

$$\vec{n} = (2, -1) \Rightarrow \vec{B}(\frac{1}{\sqrt{5}}) = n$$

$$(1, 0) = n'$$

$$\cos \varphi = \frac{|n \cdot n'|}{\|n\| \cdot \|n'\|}$$

$$\cos \varphi = \frac{1}{\sqrt{5}}$$

$$\varphi = \arccos \frac{\sqrt{5}}{5}$$

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$f_1: y = x^2 - 4$
 $f_2: y = 4 - x^2$
 $x^2 - 4 = 4 - x^2$
 $2x^2 = 8$
 $x^2 = 4$
 $x = \pm 2$
 $f_1: \frac{f_1'(x)}{f_1(x)} = \frac{2x}{x^2 - 4}$
 $f_2: \frac{f_2'(x)}{f_2(x)} = \frac{-2x}{4 - x^2}$
 $f_1: y = 0 + 4(x - 2)$
 $f_2: y = 0 - 4(x + 2)$
 $y = 4x - 8$
 $y = -4x - 8$
 $4x - 8 = 0 \Rightarrow x = 2$
 $-4x - 8 = 0 \Rightarrow x = -2$
 $Q_1(2, 0)$
 $Q_2(-2, 0)$
 $\cos \varphi = \frac{|x_1 - x_2|}{\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}} = \frac{4}{\sqrt{16 + 64}} = \frac{4}{\sqrt{80}} = \frac{1}{\sqrt{5}}$
 $\varphi = \arccos \frac{1}{\sqrt{5}}$
 $f(x) = k \cdot x$
 $g(x) = x$
 $f'(x) = k$
 $\frac{f'(x_0)}{g'(x_0)} = \frac{k}{1} = 1$
 $x_0 = 1$
 $y_0 = 0$
 $P_1: y = k(x - 1) + 0$
 $P_2: y = (k - 1)(x - 1) + 0$

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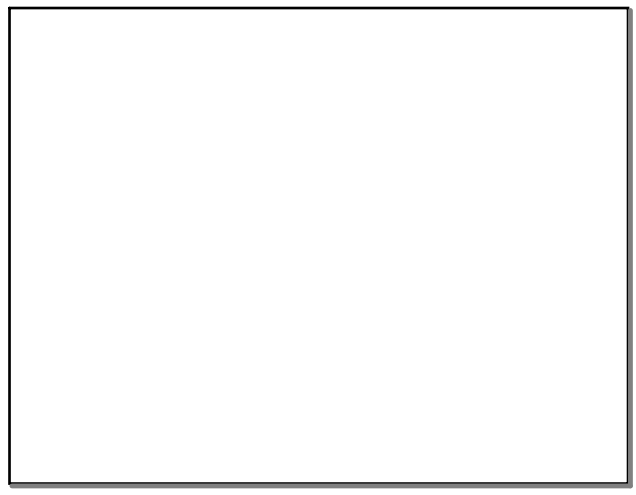
$f'(x_0) = 1$
 $\frac{1}{x_0} = 1$
 $x_0 = 1$
 $y = x + q$
 $[1, 0]$

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$f(x) = \begin{cases} x & x < 0 \\ k(1+x) & x \geq 0 \end{cases}$
 $D(f) = \mathbb{R}$

$f'(x) = x^{-1} = \frac{1}{x}$
 $f'(x) = (k(1+x))' = \frac{1}{x+1}$
 $f'(0) = 1$
 $f'_+(0) = 1$
 $f'(x) = \begin{cases} 1 & x < 0 \\ \frac{1}{x+1} & x \geq 0 \end{cases}$

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