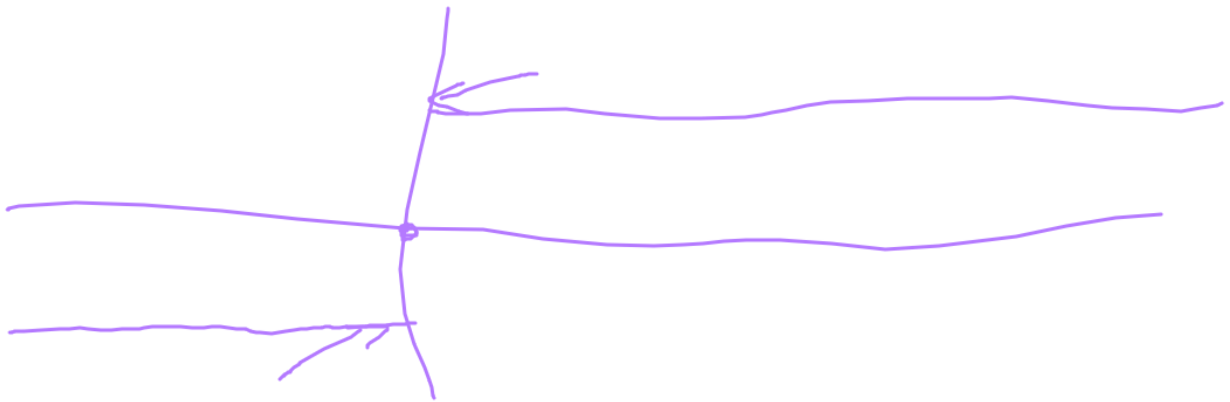
$$\lim_{x \to 1} \lfloor x \rfloor - x =$$

$$\lim_{x \to 1^-} 0 - 1 = -1$$

$$\lim_{x \to 1^+} 1 - 1 = 0$$



$$o(x^3)$$

$$\lim_{x \to 0} \frac{(1+mx)^n - (1+nx)^m}{x^2} =$$

$$\lim_{x \to 0} \frac{\cancel{1} + n\cancel{m}x + \frac{n(n-1)}{2} m^2 x^2 - \left(\cancel{1} + n\cancel{m}x + \frac{m(m-1)}{2} n^2 x^2\right)}{x^2}$$

$$= \lim_{x \to 0} \left(\frac{n(n-1)}{2} m^2 - \frac{m(m-1)}{2} n^2 + o(x) \right)$$

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}$$

$$\lim_{x \to 0} \frac{x^2 - 1}{2x^2 - x - 1} = \lim_{x \to 0} \frac{1 - x^2}{1 - x - 2x^2}$$

$$= \lim_{x \to 0} \frac{1 - o(x)}{1 - o(x)}$$

$$\lim_{x \to 0} \frac{1 + 5x + x^7 - (1 + x^{10})^{10}}{x} =$$

$$= \lim_{x \to 0} \frac{\cancel{1} + 5x + x^7 - \cancel{1} - 10x^{10} - 90x^{20} - \dots}{x}$$

$$= \lim_{x \to 0} \frac{5x + x^7 + \dots}{x} = \lim_{x \to 0} \left(5 + \overbrace{x^6 + \dots}^{o(x^6)}\right)$$

$$\lim_{x \to 0} e^{\frac{\sqrt[3]{1-x^2}-1}{5x^2}} = \lim_{x \to 0} e^{\frac{1-x^2-1}{5x^2\left(1+\sqrt[3]{1-x}+(1-x)^{\frac{2}{3}}\right)}}$$

$$= \lim_{x \to 0} e^{-\frac{1}{5(\quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad)}} = e^{-\frac{1}{15}}$$

$$\lim_{x \to a} \frac{tg(x) - tg(a)}{x-a} = \lim_{x \to a} \frac{tg(x-a)(1+tg(x)tg(a))}{x-a}$$

$$= \lim_{x \to a} \frac{\sin(x-a)(1+tg(x)tg(a))}{(x-a)\cos(x-a)} \underset{=}{\underline{x=a+h}}$$

$$= \lim_{h \to 0} \frac{\sin(h)(1+tg(a+h)tg(a))}{h\cos(h)} =$$

$$= \frac{1+tg^2(a)}{1}$$

$$\lim_{x \to 0} \frac{2\ln(\cos(ax))}{2\ln(\cos(bx))} = \lim_{x \to 0} \frac{\ln(1-\sin^2(ax))}{\ln(1-\sin^2(bx))}$$

$$= \lim_{x \to 0} \frac{\ln(1+(-\sin^2(ax)))}{-\sin^2(ax)} \cdot \frac{-\sin^2(bx)}{\ln(1+(-\sin^2(bx)))}$$

$$\frac{\sin^2(ax)}{\sin^2(bx)}$$

$$= \lim_{x \to 0} \frac{\ln(1+(-\sin^2(ax)))}{-\sin^2(ax)} \quad \frac{-\sin^2(bx)}{\ln(1+(-\sin^2(bx)))}$$

$$\underbrace{\frac{\sin^2(ax)}{\sin^2(bx)}}_{} = \lim_{x \to 0} \underbrace{\frac{\cdots}{\cdots}}_{} \quad \underbrace{\frac{\cdots}{\cdots}}_{}$$

$$\frac{\sin^2(ax)}{(ax)^2} \quad \frac{(bx)^2}{\sin^2(bx)} \quad \frac{(ax)^2}{\underbrace{(bx)^2}_{}} = \frac{a^2}{b^2}$$

$$\lim_{x\to 0^+} (\cos(\sqrt{x}))^{\frac{1}{x}} = \lim_{x\to 0^+} e^{\frac{1}{x}\ln(\cos(\sqrt{x}))}$$

$$= \lim_{x\to 0^+} e^{\frac{1}{2x}\ln(1-\sin^2(\sqrt{x}))} =$$

$$= \lim_{x\to 0^+} e^{-\frac{\sin^2(\sqrt{x})}{2x}\cdot\frac{\ln(1-\sin^2(\sqrt{x}))}{-\sin^2(\sqrt{x})}}$$

$$= \lim_{x \to 0^+} e^{-\frac{\sin^2(\sqrt{x})}{2x} \cdot \frac{\ln(1-\sin^2(\sqrt{x}))}{-\sin^2(\sqrt{x})}}$$

$$= \lim_{x \to 0^+} e^{-\frac{1}{2}\overbrace{\left(\frac{\sin(\sqrt{x})}{\sqrt{x}}\right)^2}^{1} \overbrace{\frac{\ln(1-\sin^2(\sqrt{x}))}{-\sin^2(\sqrt{x})}}^{1}}$$

$$= e^{-\frac{1}{2}}$$

$$\sum_{n=1}^{\infty} \frac{\cos(nx) - \cos((n+1)x)}{n} = \frac{\cos(nx)}{n} - \frac{\cos((n+1)x)}{n+1} + \frac{\cos((n+1)x)}{n+1}$$

$$=$$