

Ex1 a)  $\lim_{x \rightarrow 0} \frac{1 - \cos(x)}{x^2} = \frac{1}{2}$

b)  $\lim_{x \rightarrow +\infty} \frac{\sqrt[3]{8+x^2}}{x(x+1)} = 0$

c)  $\lim_{x \rightarrow 7\pi} \frac{\sin^2(\frac{x}{7})}{1 + \cos(\frac{x}{7})} = -2$

d)  $\lim_{x \rightarrow 1^+} \frac{x - 1 - x \ln(x)}{x^2 \ln(x)} = 0$

Ex2 a)  $a'(x) = \frac{-10x}{(x^2+3)^2}$

b)  $b(x) = \frac{-\sin(3x)}{1-x} + 3 \ln(1-x) \cos(3x)$

c)  $c'(x) = (1 + \tan^2(\frac{\pi}{x})) (-\frac{\pi}{x^2}) + \tan(\frac{\pi}{x}) (\frac{e^x - e^{-x}}{2})$

d)  $d'(x) = \frac{-2x-1}{(x+2)^2 \sqrt{-x^2+1}}$

Ex3 a)  $D(f) = ]0, +\infty[$

b)  $\lim_{x \rightarrow 0^+} x (\ln(x))^2 = 0, \quad \lim_{x \rightarrow +\infty} x (\ln(x))^2 = +\infty$

c)  $f'(x) = \ln(x) (\ln(x) + 2)$

	0	$e^{-2}$	1	$+\infty$
$f'(x)$		+	-	+
$f(x)$		croissante	décroissante	croissante

Ex 4

$$a) \quad M \cdot M^T = (a^2 + b^2 + c^2 + d^2) \underline{\underline{I}}_4$$

$$b) \quad \det(M)^2 = (a^2 + b^2 + c^2 + d^2)^4$$

$$\begin{aligned} \det M \neq 0 &\iff a^2 + b^2 + c^2 + d^2 \neq 0 \\ &\iff a \text{ ou } b \text{ ou } c \text{ ou } d \neq 0 \\ &\iff (a, b, c, d) \neq (0, 0, 0, 0) \end{aligned}$$

$$si \quad (a, b, c, d) \neq (0, 0, 0, 0)$$

$$M \left( \frac{1}{a^2 + b^2 + c^2 + d^2} M^T \right) = \underline{\underline{I}}_4$$

$$\text{donc} \quad M^{-1} = \frac{1}{a^2 + b^2 + c^2 + d^2} M^T$$