

$$\textcircled{1}. \lim_{n \rightarrow +\infty} \left(4n + \frac{4}{n+2} \right) \rightarrow +\infty \quad (+\infty + 0 = +\infty)$$

$$\bullet \frac{3n^2 - 5n}{n-1} = \frac{n^2(3 - \frac{5}{n})}{n(1 - \frac{1}{n})} = \frac{n(3 - \frac{5}{n})}{1 - \frac{1}{n}} \xrightarrow{n \rightarrow +\infty} +\infty \quad \left(+\infty \cdot \frac{3}{1} = +\infty \right)$$

$$\text{donc } \frac{n^3}{3} + \frac{3n^2 - 5n}{n-1} \xrightarrow{n \rightarrow +\infty} +\infty \quad (+\infty + +\infty = +\infty)$$

$$\bullet M + (-1)^n = M \left[1 + \frac{(-1)^n}{n} \right]$$

$$-\frac{1}{n} \leq \frac{(-1)^n}{n} \leq \frac{1}{n}, \quad \forall n > 0 \quad \lim_{n \rightarrow +\infty} \pm \frac{1}{n} = 0, \text{ donc } \lim_{n \rightarrow +\infty} \frac{(-1)^n}{n} = 0 \quad (\text{Tds genres})$$

$$\Rightarrow \lim_{n \rightarrow +\infty} M \left[1 + \frac{(-1)^n}{n} \right] = +\infty \quad (+\infty \cdot [1+0] = +\infty)$$

$$\bullet x^2 + x \sin x = x^2 \left(1 + \frac{\sin x}{x} \right)$$

$$-1 \leq \sin x \leq 1, \quad \forall x \rightarrow \forall x > 0 \quad -\frac{1}{x} \leq \frac{\sin x}{x} \leq \frac{1}{x}$$

$$\lim_{x \rightarrow +\infty} \pm \frac{1}{x} = 0, \text{ donc } \lim_{x \rightarrow +\infty} \frac{\sin x}{x} = 0 \quad (\text{Tds genres})$$

$$\Rightarrow \lim_{x \rightarrow +\infty} x^2 \left(1 + \frac{\sin x}{x} \right) = +\infty \quad (+\infty \cdot (+\infty) = +\infty)$$

$$\bullet \frac{3x-5}{x+1} \sim \frac{x(3 - \frac{5}{x})}{x(1 + \frac{1}{x})} \xrightarrow{x \rightarrow +\infty} \frac{3-0}{1+0} = 3$$

$$\frac{\sin x}{x} \rightarrow 0 \quad (\text{voir exo prcdnt}). \text{ Donc } \frac{3x-5}{x+1} + \frac{\sin x}{x} \rightarrow 3$$

$$\bullet f(x) = \sqrt{x^2 + 3x} - x = x \sqrt{1 + \frac{3}{x}} - x = x \left(\sqrt{1 + \frac{3}{x}} - 1 \right)$$

$$= x \left(1 + \frac{3}{2x} + o\left(\frac{1}{x}\right) - 1 \right) = x \left(\frac{3}{2} + o\left(\frac{1}{x}\right) \right) = 3 + o(1) \rightarrow 3$$