

Ex 1

$$a) \lim_{n \rightarrow +\infty} n^3 \left(1 - \frac{5}{n} + \frac{2}{n^3}\right) = +\infty$$

$$b) \lim_{n \rightarrow +\infty} (3n+2)(1-n) = -\infty$$

$$c) \lim_{n \rightarrow +\infty} \frac{1 - \frac{1}{n^2}}{1 + \frac{1}{n^2}} = 1$$

$$d) \lim_{n \rightarrow +\infty} \frac{5}{2\sqrt{n}-1} = 0$$

$$e) \lim_{n \rightarrow +\infty} 2n^3 + 3n - 1 = +\infty$$

$$f) \lim_{n \rightarrow +\infty} \frac{n(1 - \frac{2}{n})}{1 + \frac{3}{n}} = +\infty$$

$$g) \lim_{n \rightarrow +\infty} (5n-1)(3 + \frac{1}{n}) = +\infty$$

$$h) \lim_{n \rightarrow +\infty} n^2 \left(-2 + \frac{10}{n}\right) = -\infty$$

$$i) \lim_{n \rightarrow +\infty} \frac{3 + \frac{1}{n}}{n(1 + \frac{2}{n})} = 0$$

$$j) \lim_{n \rightarrow +\infty} \frac{2}{3 + \frac{5}{n}} = \frac{2}{3}$$

$$k) \lim_{n \rightarrow +\infty} 6 - \frac{2}{n+3} = 6$$

$$l) \lim_{n \rightarrow +\infty} n \left(2 - \frac{1}{\sqrt{n}}\right) = +\infty$$

$$k) \lim_{n \rightarrow +\infty} 6 - \frac{2}{n+3} = 6$$

$$l) \lim_{n \rightarrow +\infty} n \left(2 - \frac{1}{\sqrt{n}}\right) = +\infty$$

$$m) \lim_{n \rightarrow +\infty} \frac{6 + \frac{3}{n} + \frac{5}{n^2}}{2 - \frac{5}{n} + \frac{1}{n^2}} = 3$$

$$n) \lim_{n \rightarrow +\infty} \frac{3}{\sqrt{n}} - 5n = -\infty$$

$$o) \lim_{n \rightarrow +\infty} \frac{2 + \frac{3}{n^3}}{n \left(5 - \frac{8}{n^2} + \frac{1}{n^3}\right)} = 0$$

Ex 2

théorème des gendarmes

$$\left\{ \begin{array}{l} a) -\frac{1}{n} \leq u_n \leq \frac{1}{n} \quad \text{d'où } \lim_{n \rightarrow +\infty} u_n = 0 \quad \text{car } \lim_{n \rightarrow +\infty} \frac{1}{n} = \lim_{n \rightarrow +\infty} -\frac{1}{n} = 0 \\ b) -\frac{1}{n} \leq u_n \leq \frac{1}{n} \quad \text{d'où } \lim_{n \rightarrow +\infty} u_n = 0 \quad \text{car } \lim_{n \rightarrow +\infty} -\frac{1}{n} = \lim_{n \rightarrow +\infty} \frac{1}{n} = 0 \end{array} \right.$$

par comparaison

$$\left\{ \begin{array}{l} c) u_n \geq n^2 - n = n(n-1) \quad \text{d'où } \lim_{n \rightarrow +\infty} u_n = +\infty \quad \text{car } \lim_{n \rightarrow +\infty} n(n-1) = +\infty \\ d) u_n \leq n - n \quad \text{d'où } \lim_{n \rightarrow +\infty} u_n = -\infty \quad \text{car } \lim_{n \rightarrow +\infty} n - n = -\infty \\ e) u_n \geq n - 3 \quad \text{d'où } \lim_{n \rightarrow +\infty} u_n = +\infty \quad \text{car } \lim_{n \rightarrow +\infty} n - 3 = +\infty \end{array} \right.$$