

Trouver, si elles existent, les limites suivantes :

$$1 \quad \lim_{x \rightarrow 4} \frac{(x-4)(x-3)}{(x-4)}$$

$$2 \quad \lim_{x \rightarrow 3} \frac{(x-3)(x-4)}{(x-3)}$$

$$3 \quad \lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x - 1}$$

$$4 \quad \lim_{x \rightarrow -2} \frac{x^2 + 4x + 4}{x^2 + 5x + 6}$$

$$5 \quad \lim_{x \rightarrow 2} \frac{2x^2 - 5x + 2}{x^2 + 2x - 8}$$

$$6 \quad \lim_{x \rightarrow 1/3} \frac{3x^2 - 4x + 1}{3x^2 - 10x + 3}$$

$$7 \quad \lim_{x \rightarrow -4} \frac{(x-1)(x^2-16)}{x^2 + 3x - 4}$$

$$8 \quad \lim_{x \rightarrow -1} \frac{\sqrt{x+5} - 2}{x+1}$$

$$9 \quad \lim_{x \rightarrow 4} \frac{\sqrt{2x+1} - \sqrt{x+5}}{x-4}$$

$$10 \quad \lim_{x \rightarrow 1} \frac{x-1}{\sqrt{2x+3} - \sqrt{5}}$$

$$11 \quad \lim_{x \rightarrow 0} \frac{x^2 + 13x}{x^2 + x}$$

$$12 \quad \lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x^2 - 4}$$

$$13 \quad \lim_{x \rightarrow 5} \frac{\sqrt{9-x} - 2}{x-5}$$

$$14 \quad \lim_{x \rightarrow -1} \sqrt{\frac{2x^2 + 7x + 5}{x+1}}$$

$$15 \quad \lim_{x \rightarrow -2} \frac{x^2 - 5x - 14}{x^2 + 6x + 8}$$

$$16 \quad \lim_{x \rightarrow 1} \frac{2x^2 + x - 3}{x^2 + 3x - 4}$$

$$17 \quad \lim_{x \rightarrow 2} \frac{x^2 - 13x + 22}{x^2 - 10x + 16}$$

$$18 \quad \lim_{x \rightarrow 1} \frac{x^3 - 3x^2 - x + 3}{x^3 - x^2 - 4x + 4}$$

$$19 \quad \lim_{x \rightarrow 3} \frac{x^4 - 81}{x - 3}$$

$$20 \quad \lim_{x \rightarrow -1} \frac{x+1}{\sqrt{x^2+2}}$$

$$21 \quad \lim_{x \rightarrow 1} \frac{\sqrt{x^2+x-1} - 1}{x-1}$$

$$22 \quad \lim_{x \rightarrow 0} \frac{\sqrt{3+x} - \sqrt{3}}{x}$$

$$25 \quad \lim_{x \rightarrow 0} \frac{x^3 + x^2 + x}{x}$$

$$46 \quad \lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x+1} - \sqrt{3}}$$

$$32 \quad \lim_{x \rightarrow 1} \frac{x-1}{\sqrt{x^2+1} - \sqrt{2}}$$

$$47 \quad \lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} \quad \text{si } f(x) = 3x - 2$$

$$48 \quad \lim_{\Delta x \rightarrow 0} \frac{f(3+\Delta x) - f(3)}{\Delta x} \quad \text{si } f(x) = x^2 + 2$$

$$49 \quad \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \quad \text{si } f(x) = x^2 + x - 3$$

$$50 \quad \lim_{\Delta x \rightarrow 0} \frac{g(x+\Delta x) - g(x)}{\Delta x} \quad \text{si } g(x) = x^3 + 7$$

$$51 \quad \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \quad \text{si } f(x) = \sqrt{2x-7}$$

Réponse :

1. 1

2. -1

3. 3

4. 0

5.

$$\begin{aligned} \lim_{x \rightarrow 2} \frac{2x^2 - 5x + 2}{x^2 + 2x - 8} &= \lim_{x \rightarrow 2} \frac{(2x-1)(x-2)}{(x+4)(x-2)} \\ &= \lim_{x \rightarrow 2} \frac{2x-1}{x+4} = \frac{3}{6} = \frac{1}{2} \end{aligned}$$

6. 1/4

10.  $\sqrt{5}$

11. 13      15.  $-9/2$       19. 108

12. 5/4      16. 1      20. 0

13.  $-1/4$       17. 3/2      21. 3/2

14.  $\sqrt{3}$       18. 4/3      22.  $\sqrt{3}/6$       25. 1      32.  $\sqrt{2}$       46.  $2\sqrt{3}$

7. -8

8.

$$\begin{aligned} \lim_{x \rightarrow -1} \left( \frac{\sqrt{x+5} - 2}{x+1} \right) \times \frac{(\sqrt{x+5} + 2)}{(\sqrt{x+5} + 2)} \\ &= \lim_{x \rightarrow -1} \frac{(x+5) - 4}{(x+1)(\sqrt{x+5} + 2)} = \lim_{x \rightarrow -1} \frac{x+1}{(x+1)(\sqrt{x+5} + 2)} \\ &= \lim_{x \rightarrow -1} \frac{1}{\sqrt{x+5} + 2} = \frac{1}{4} \end{aligned}$$

9.

$$\begin{aligned} \lim_{x \rightarrow 4} \left( \frac{\sqrt{2x+1} - \sqrt{x+5}}{x-4} \right) \times \frac{(\sqrt{2x+1} + \sqrt{x+5})}{(\sqrt{2x+1} + \sqrt{x+5})} \\ &= \lim_{x \rightarrow 4} \frac{(2x+1) - (x+5)}{(x-4)(\sqrt{2x+1} + \sqrt{x+5})} = \lim_{x \rightarrow 4} \frac{x-4}{(x-4)(\sqrt{2x+1} + \sqrt{x+5})} \\ &= \lim_{x \rightarrow 4} \frac{1}{\sqrt{2x+1} + \sqrt{x+5}} = \frac{1}{6} \end{aligned}$$

47.  $\pi$

$$\begin{aligned} 48. \lim_{\Delta x \rightarrow 0} \frac{f(3 + \Delta x) - f(3)}{\Delta x} &= \lim_{\Delta x \rightarrow 0} \frac{[(3 + \Delta x)^2 + 2] - [3^2 + 2]}{\Delta x} \\ &= \lim_{\Delta x \rightarrow 0} \frac{9 + 6\Delta x + (\Delta x)^2 + 2 - 9 - 2}{\Delta x} \\ &= \lim_{\Delta x \rightarrow 0} \frac{6\Delta x + (\Delta x)^2}{\Delta x} \\ &= \lim_{\Delta x \rightarrow 0} (6 + \Delta x) = 6 \end{aligned}$$

49.  $2x+1$

50.  $3x^2$

51.

$$\begin{aligned} \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} &= \lim_{h \rightarrow 0} \frac{\sqrt{2(x+h)-7} - \sqrt{2x-7}}{h} \\ &= \lim_{h \rightarrow 0} \frac{\sqrt{2x+2h-7} - \sqrt{2x-7}}{h} \times \frac{(\sqrt{2x+2h-7} + \sqrt{2x-7})}{(\sqrt{2x+2h-7} + \sqrt{2x-7})} \\ &= \lim_{h \rightarrow 0} \frac{(2x+2h-7) - (2x-7)}{h(\sqrt{2x+2h-7} + \sqrt{2x-7})} \\ &= \lim_{h \rightarrow 0} \frac{2h}{h(\sqrt{2x+2h-7} + \sqrt{2x-7})} \\ &= \lim_{h \rightarrow 0} \frac{2}{\sqrt{2x+2h-7} + \sqrt{2x-7}} = \frac{2}{\sqrt{2x-7} + \sqrt{2x-7}} \\ &= \frac{2}{2\sqrt{2x-7}} = \frac{1}{\sqrt{2x-7}} \end{aligned}$$