

Exercice 1 : Valeurs de la fonction $x \mapsto x^2 \ln(x)$

$$f(e) = e^2$$

$$f(1/e) = -e^{-2}$$

$$f(\sqrt{e}) = e/2$$

$$f(e^2) = 2e^4$$

$$f(1/e^2) = -2e^{-4}$$

$$f(1/\sqrt{e}) = -e^{-1}/2 = -\frac{1}{2e}$$

Exercice 2 : Simplifications diverses

$$A = 4$$

$$B = 36 \ln(2)$$

$$C = \frac{x}{2}$$

$$D = e^{-2}$$

$$E = (\ln(x) - 1)^2 = \ln^2\left(\frac{x}{e}\right)$$

$$F = \ln(e^{xy} - 1)$$

Exercice 3 : Simplifications de puissances

$$\sqrt[3]{2} \times \sqrt[3]{2^5} = 4$$

$$(\sqrt[6]{3})^3 = \sqrt{3}$$

$$\sqrt[5]{3} \times \sqrt[3]{9} \times \sqrt[15]{3^2} = 3$$

$$(2^{2n})^{(2n)^{2n}} = 2^{(2n)^{1+2n}}$$

Exercice 6 : Ensembles de définition, et limites

$$1. D_1 = \mathbf{R} \quad \lim_{-\infty} f_1 = -\infty \quad \lim_{+\infty} f_1 = +\infty$$

$$2. D_2 = \mathbf{R}_+^* \setminus \{4\} \quad \lim_0 f_2 = +\infty \quad \lim_{4^-} f_2 = -\infty \quad \lim_{4^+} f_2 = +\infty \quad \lim_{+\infty} f_2 = 0$$

$$3. D_3 = \mathbf{R} \quad \lim_{-\infty} f_3 = +\infty \quad \lim_{+\infty} f_3 = +\infty$$

$$4. D_4 = \mathbf{R} \quad \lim_{-\infty} f_4 = 0 \quad \lim_{+\infty} f_4 = +\infty$$

$$5. D_5 = \mathbf{R} \quad \lim_{-\infty} f_5 = 0 \quad \lim_{+\infty} f_5 = +\infty$$

$$6. D_6 =]-1, 1] \quad \lim_{-1} f_6 = +\infty \quad \lim_1 f_6 = 0$$

$$7. D_7 =]0, e] \quad \lim_0 f_7 = +\infty \quad \lim_e f_7 = 0$$

$$8. D_8 = \mathbf{R}_+^* \quad \lim_0 f_8 = 0 \quad \lim_{+\infty} f_8 = 1$$

$$9. D_9 = \mathbf{R}_+^* \quad \lim_0 f_9 = 1 \quad \lim_{+\infty} f_9 = 0$$

$$10. D_{10} = \mathbf{R} \setminus \{1, 2\} \quad \lim_{\pm\infty} f_{10} = 0 \quad \lim_{1^-} f_{10} = \lim_{2^+} f_{10} = +\infty \quad \lim_{1^+} f_{10} = \lim_{2^-} f_{10} = -\infty$$

$$11. D_{11} =]\ln(2), +\infty[\quad \lim_{\ln(2)} f_{11} = +\infty \quad \lim_{+\infty} f_{11} = +\infty$$