

LDDR - Niveau 1 - TE1 Calcul - AlgèbreEXERCICE 1.

$$b \in \{a, b\} \quad (V)$$

$$\{a, d\} \in \{a, b, c\} \quad (V)$$

$$0 \in \mathbb{N}^* \quad (F)$$

$$\mathbb{Z}_+ = \mathbb{N} \quad (V)$$

$$\sqrt{2} \in \mathbb{Q} \quad (F)$$

$$\sqrt[3]{-27} = -3 \in \mathbb{N} \quad (F)$$

$$\{a, b, c\} \setminus \{a, c\} = \emptyset \quad (F)$$

$$-\frac{5}{2} \in]-\infty, -2] \quad (V)$$

$$0 \in]0, 3] \quad (F)$$

EXERCICE 2

$$A = \{x/x \in \mathbb{R} \text{ et } -2 < x < 5\} =]-2; 5[$$

$$B = \{x/x \in \mathbb{R} \text{ et } x < -3\} =]-\infty; -3[$$

$$C = \{x/x \in \mathbb{R} \text{ et } x \geq 10\} = [10; +\infty[$$

$$D = \{x/x \in \mathbb{R} \text{ et } x > 3 \text{ ou } x \leq -1\} =]-\infty; -1] \cup]3; +\infty[$$

EXERCICE 3

$$1. (4x+5)(10-11x) = 40x+50-44x^2-55x = -44x^2-15x+50$$

$$2. -5x(x-3)(1-2x^2) = (-5x^2+15x)(1-2x^2) =$$

$$= -5x^2+15x+10x^4-30x^3 = 10x^4-30x^3-5x^2+15x$$

$$3. (3a-b)(3a+b) = (3a)^2 - b^2 = 9a^2 - b^2$$

$$4. (3x+2y)^2 = 9x^2 + 12xy + 4y^2$$

EXERCICE 4

$$1. 5xy^3 - 10xy^2 + 5xy = 5xy(y^2 - 2y + 1) = 5xy(y-1)^2$$

$$2. x^2 + 6x + 9 = (x+3)^2$$

$$3. 16x^2 - 1 = (4x-1)(4x+1)$$

$$4. 3x^3 - 27x = 3x(x^2 - 9) = 3x(x-3)(x+3)$$

$$5. 3x^2 + 24x + 48 = 3(x^2 + 8x + 16) = 3(x+4)^2$$

$$6. (x^2-5)(x^2-1) - 4(x^2-1) = (x^2-1)(x^2-5-4) = (x^2-1)(x^2-9)$$

$$= (x-1)(x+1)(x-3)(x+3)$$

EXERCICE 5

$$A = \frac{1}{b} - \frac{1}{bc} = \frac{c-1}{bc}$$

$$B = \frac{m^2-1}{m-1} = \frac{(m-1)(m+1)}{m-1} = m+1$$

$$C = \frac{2t}{4-t^2} + \frac{1}{2+t} = \frac{2t}{(2-t)(2+t)} + \frac{1}{2+t} = \frac{2t + (2-t)}{(2-t)(2+t)} = \frac{t+2}{(2-t)(2+t)}$$

$$= \frac{1}{2-t}$$

$$D = \frac{x-y}{2x} - (1-y) = \frac{x-y - (1-y)2x}{2x} = \frac{x-y-2x+2xy}{2x}$$

$$= \frac{2xy-y-x}{2x}$$

-2-

$$E = \frac{x - \frac{9}{x}}{1 - \frac{3}{x}} = \frac{\frac{x^2 - 9}{x}}{\frac{x-3}{x}} = \frac{(x-3)(x+3)}{x-3} = x+3$$

$$F = \frac{\frac{1}{ab} + \frac{1}{ac}}{\frac{1}{ab} + \frac{1}{bc}} = \frac{\frac{c+b}{abc}}{\frac{c+a}{abc}} = \frac{c+b}{c+a}$$

EXERCISE 6

$$A = (x^{-3}y^5)^3 = x^{-9}y^{15} = \frac{y^{15}}{x^9}$$

$$B = b^{4n-7}b^{-n+7} = b^{4n-7-n+7} = b^{3n}$$

$$C = \frac{z^5}{z^{3-6n}} = z^{5-3+6n} = z^{6n+2}$$

$$D = \left(\frac{a^5}{b^6c}\right)^{-4} \left(\frac{a^4b^{-3}}{c^5}\right)^4 = \frac{a^{-20}}{b^{-24}c^{-4}} \cdot \frac{a^{16}b^{-12}}{c^{20}} = \frac{a^{-4}b^{12}}{c^{16}} = \frac{b^{12}}{a^4c^{16}}$$

EXERCISE 7

$$1. \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$\frac{12}{\sqrt{3}} - \sqrt{27} = \frac{12\sqrt{3}}{3} - \sqrt{27} = 4\sqrt{3} - 3\sqrt{3} = \sqrt{3}$$

$$\frac{\sqrt{2}}{\sqrt{5}-\sqrt{2}} = \frac{\sqrt{2}(\sqrt{5}+\sqrt{2})}{\sqrt{5}^2-\sqrt{2}^2} = \frac{\sqrt{2}(\sqrt{5}+\sqrt{2})}{5-2} = \frac{\sqrt{2}(\sqrt{5}+\sqrt{2})}{3}$$

$$\frac{\sqrt{12}-\sqrt{3}}{\sqrt{2}} = \frac{(\sqrt{12}-\sqrt{3})\sqrt{2}}{12} = \frac{12-\sqrt{36}}{12} = \frac{12-6}{12} = \frac{1}{2}$$

$$2. \sqrt[n]{a^{4n}} = a^{4n/n} = a^4$$

$$(\sqrt[3]{x^2})^9 = x^{18/3} = x^6$$

$$\frac{(a^2)^{3n}}{\sqrt[3]{a^{18n}}} = \frac{a^{6n}}{a^{6n}} = 1$$

$$\sqrt[3]{\frac{2^3}{64}} = \left(\frac{2^3}{2^6}\right)^{1/3} = (2^{-3})^{1/3} = 2^{-1} = \frac{1}{2}$$