

RÉVISIONS
CALCUL NUMÉRIQUE – CALCUL LITTÉRAL

Note : Evaluation sur les exercices suivants lors de la première semaine de cours de mathématiques.

S'entraîner avec les exercices du livre « Exercices de perfectionnement en calcul » de Véronique Perdu chez Ellipses :

- pages 7 à 12
- page 73
- pages 79 à 81
- pages 99 à 101

et avec les exercices suivants.

I. CALCUL FRACTIONNAIRE**Exercice 1**

Calculer puis donner les résultats sous forme de fraction irréductible.

$$A = \frac{1}{4} + \frac{2}{15} \times \frac{3}{4} \qquad B = \frac{\frac{1}{3} + \frac{2}{5}}{\frac{3}{4}} \qquad C = \left(\frac{1}{3} + \frac{2}{5}\right) \times \frac{3}{4} \qquad D = \frac{4}{3} - \frac{2}{3} \times \frac{5}{2} \qquad E = \frac{\frac{7}{9}}{\frac{1}{3} - 2}$$

$$F = \frac{(1 - \frac{1}{5})(1 - \frac{2}{5})(1 - \frac{4}{5})(1 - \frac{5}{5})}{3} \qquad G = \frac{12}{9 + \frac{8}{7 + \frac{6}{5 + \frac{4}{3 + \frac{2}{1+1}}}}} \qquad H = \left(2 + \frac{3}{4}\right) \times \frac{1}{2 + \frac{3}{4}} - \frac{\frac{3}{7} \frac{8}{9}}{\frac{8}{9} - \frac{3}{7}}$$

$$I = \left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{4}\right) \dots \left(1 - \frac{1}{2020}\right)$$

II. PUISSANCES**Exercice 2**

Simplifier puis donner le résultat sous forme décimale.

$$A = \frac{10^4 \times 7^{-1}}{2^7 \times 7^{-3} \times 5^7} \qquad B = \left(\frac{3^{-9} \times (10^{-3})^{-2}}{2^{-1} \times 10^5 \times 3^{-10}}\right)^2$$

Exercice 3

Soient a et b des nombres non nuls.

Ecrire les expressions sous la forme $a^n \times b^m$ avec n et m des entiers relatifs.

$$A = \frac{a^2 \times b^{-3}}{a^{-2} \times b} \qquad B = \frac{(ab^2)^{-1}}{(a^2b^3)^2} \qquad C = (a^3b)^3 (a^2b^5)^4 \qquad D = \frac{(ab^3)^{-4} (a^{-2}b)^2}{a^{-6}b^4}$$

Exercice 4

$$\text{On pose } B(n) = \frac{(8^{n+1} + 8^n)^2}{(4^n - 4^{n-1})^3}$$

1. Calculer $B(n)$ pour $n = 0$ et $n = 1$.
2. Montrer que $B(n)$ ne dépend pas de n .

III. RACINES CARREES**Exercice 5**

Simplifier le plus possible les expressions suivantes.

$$A = \sqrt{27} + 2\sqrt{75} - \sqrt{108} \qquad B = \sqrt{150} + \sqrt{96} - 4\sqrt{24}$$

Exercice 6

Rendre rationnels les dénominateurs des expressions suivantes.

$$A = \frac{2}{\sqrt{3}} \qquad B = \frac{-8}{\sqrt{2}} \qquad C = \frac{5}{\sqrt{6}-1} \qquad D = \frac{1-\sqrt{3}}{1+\sqrt{3}} \qquad E = \frac{1+\sqrt{3}}{2+2\sqrt{3}}$$

Exercice 7

Exprimer sans racine carrée.

$$A = \sqrt{(-5)^2} \qquad B = \sqrt{(1-\sqrt{3})^2} \qquad C = (\sqrt{2\sqrt{3}})^4 \qquad D = \left(\frac{5-\sqrt{2}}{\sqrt{3}}\right)^2$$

IV. CALCUL LITTERAL**Exercice 8**

Développer les expressions suivantes.

$$\begin{aligned} A &= (3x-4)(6x-1) & B &= (-2x+3)(4x-3) & C &= 2(3x+1)(5x-2) \\ D &= -7(2x-3)(4x-9) & E &= x(2-3x)+6x^2+3x & F &= (5-x)(1+2x)+(2x+3)(4x+8) \\ G &= (7x-2)(2x+6)-4(3x-7)(x-5) & H &= (2a^3-7b)(-7a+3b^2) \\ I &= (2a^3b-7ab^3)(-a^3b+2ab^3) & J &= (2x-5)^2 & K &= (4x+9)^2 \\ L &= (3x^2-\frac{1}{3}x)^2 & M &= (3x-\sqrt{5})^2 & N &= \left(x+\frac{3}{5}\right)\left(x-\frac{3}{5}\right) \\ P &= \left(\frac{5}{4}x+\frac{2}{7}\right)\left(\frac{5}{4}x-\frac{2}{7}\right) & Q &= \left(3x-\frac{1}{\sqrt{3}}\right)^2 & R &= (2x+3)^3 & S &= (2x-3)^3 \\ T &= (x+a)(x-a)(x^2-a^2) & U &= (2a-1)(2a+1)(4a^2+1) \\ V &= [(x-1)+x^2][(x-1)-x^2] & W &= (a^2-ab+b^2)(a^2+ab+b^2) \\ X &= (4a^{3n}+3a^{2n})(4a^{3n}-3a^{2n}) & Y &= (2a^n-a^{n+1})^2 \end{aligned}$$

Exercice 9

Factoriser les expressions suivantes (au maximum).

$$\begin{aligned} A &= 4(x-1)+(x-1)(2x+1) & B &= (x+5)^2+(x-5)(x+5)-3(x+5) \\ C &= 5(2x-1)^3+(2x-1)^2(x+2) & D &= (2x-3)^2+5x(3-2x) \\ E &= 2x+5-(x+3)(4x+10) & F &= 1-12x+36x^2 & G &= (3x-1)^2-25 \\ H &= (2x+3)^2-(x-1)^2 & I &= 4x^2-20x+25 & J &= 2x^2+20x+50 \\ K &= \frac{4}{9}-(2x+\frac{1}{3})^2 & L &= x^2-9+(x-3)(2x+5) \\ M &= (2x-3)^2-(6-4x)(6x+1) & N &= 4x^2-4x+1+(4-8x)(3x+2) \\ P &= (25x^2+1-10x)-9x^2 \end{aligned}$$

V. SIMPLIFICATION D'EXPRESSIONS FRACTIONNAIRES

Exercice 10

Après avoir déterminé les valeurs interdites, simplifier si possible les expressions fractionnaires suivantes.

$$A = \frac{2x}{x-1} + 4$$

$$B = \frac{3x-2}{x-2} - \frac{2}{3}$$

$$C = \frac{3}{x-4} + \frac{2}{x}$$

$$D = \frac{1}{x-3} - \frac{2}{x}$$

$$E = \frac{3x+3}{3x-1} - \frac{2x}{2x+1}$$

$$F = \frac{1}{(x+1)^2} + \frac{1}{x+1} - \frac{1}{x}$$

$$G = \frac{a^3-b^3}{(a-b)^2} - \frac{(a+b)^2}{a-b}$$

$$H = \frac{\frac{6(n+1)}{n(n-1)(2n-2)}}{\frac{2n+2}{n^2(n-1)^2}}$$

$$I = \frac{2}{x+2} - \frac{1}{x-2} + \frac{8}{x^2-4}$$

$$J = \frac{1}{x} + \frac{x+2}{x^2-4} + \frac{2}{x^2-2x}$$

VI. CORRECTION DES EXERCICES**Exercice 1**

$$A = \frac{1}{4} + \frac{2}{15} \times \frac{3}{4}$$

$$A = \frac{1}{4} + \frac{1}{10}$$

$$A = \frac{7}{20}$$

$$B = \frac{\frac{1+2}{3}}{\frac{4}{4}}$$

$$B = \frac{\frac{11}{3}}{\frac{4}{4}}$$

$$B = \frac{11}{15} \times \frac{4}{3}$$

$$B = \frac{44}{45}$$

$$C = \left(\frac{1}{3} + \frac{2}{5}\right) \times \frac{3}{4}$$

$$C = \frac{11}{15} \times \frac{3}{4}$$

$$C = \frac{11}{20}$$

$$D = \frac{4}{3} - \frac{2}{3} \times \frac{5}{2}$$

$$D = \frac{4}{3} - \frac{5}{3}$$

$$D = -\frac{1}{3}$$

$$E = \frac{\frac{7}{9}}{\frac{1}{3}-2}$$

$$E = \frac{\frac{7}{9}}{-\frac{5}{3}}$$

$$E = -\frac{7}{9} \times \frac{3}{5}$$

$$E = -\frac{7}{15}$$

$$F = \frac{(1-\frac{1}{5})(1-\frac{2}{5})(1-\frac{4}{5})(1-\frac{5}{5})}{3}$$

$$F = \frac{(1-\frac{1}{5})(1-\frac{2}{5})(1-\frac{4}{5}) \times 0}{3}$$

$$F = 0$$

$$G = \frac{12}{9 + \frac{\frac{8}{6}}{7 + \frac{\frac{4}{2}}{5 + \frac{1}{3+1+1}}}}$$

$$G = \frac{12}{9 + \frac{\frac{8}{6}}{7 + \frac{4}{5+1}}}$$

$$G = \frac{12}{9 + \frac{8}{7 + \frac{6}{6}}}$$

$$G = \frac{12}{9 + \frac{8}{8}}$$

$$G = \frac{12}{10}$$

$$G = \frac{6}{5}$$

$$H = \left(2 + \frac{3}{4}\right) \times \frac{1}{2 + \frac{3}{4}} - \frac{\frac{3}{8} - \frac{8}{9}}{\frac{8}{9} - \frac{3}{7}}$$

$$H = 1 - \frac{\frac{3}{8} - \frac{8}{9}}{-\left(\frac{3}{8} - \frac{8}{9}\right)}$$

$$H = 1 - (-1)$$

$$H = 2$$

$$I = \left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{4}\right) \dots \left(1 - \frac{1}{2020}\right)$$

$$I = \frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \dots \times \frac{2018}{2019} \times \frac{2019}{2020}$$

$$I = \frac{1}{2020}$$

Exercice 2

$$A = \frac{10^4 \times 7^{-1}}{2^7 \times 7^{-3} \times 5^7}$$

$$A = \frac{2^4 \times 5^4 \times 7^{-1}}{2^7 \times 7^{-3} \times 5^7}$$

$$A = \frac{7^2}{2^3 \times 5^3}$$

$$A = \frac{49}{10^3}$$

$$A = \frac{49}{1000}$$

$$B = \left(\frac{3^{-9} \times (10^{-3})^{-2}}{2^{-1} \times 10^5 \times 3^{-10}}\right)^2$$

$$B = \left(\frac{3^{-9} \times 10^6}{2^{-1} \times 10^5 \times 3^{-10}}\right)^2$$

$$B = (2 \times 3 \times 10)^2$$

$$B = 60^2$$

$$B = 3600$$

Exercice 3

$$A = \frac{a^2 \times b^{-3}}{a^{-2} \times b}$$

$$A = a^4 \times b^{-4}$$

$$B = \frac{(ab^2)^{-1}}{(a^2b^3)^2}$$

$$B = \frac{a^{-1}b^{-2}}{a^4b^6}$$

$$B = a^{-5}b^{-8}$$

$$C = (a^3b)^3(a^2b^5)^4$$

$$C = a^9b^3a^8b^{20}$$

$$C = a^{17}b^{23}$$

$$D = \frac{(ab^3)^{-4}(a^{-2}b)^2}{a^{-6}b^4}$$

$$D = \frac{a^{-4}b^{-12}a^{-4}b^2}{a^{-6}b^4}$$

$$D = a^{-2}b^{-14}$$

Exercice 4

$$\begin{aligned}
 1. \text{ Pour } n = 0, B(0) &= \frac{(8^1+8^0)^2}{(4^0-4^{-1})^3} &&= \frac{81}{\frac{3^3}{4^3}} \\
 &= \frac{(8+1)^2}{(1-\frac{1}{4})^3} &&= 3^4 \times \frac{4^3}{3^3} \\
 &= \frac{81}{(\frac{3}{4})^3} &&= 3 \times 4^3 \\
 &&&= 192
 \end{aligned}$$

$$\begin{aligned}
 \text{Pour } n = 1, B(1) &= \frac{(8^2+8^1)^2}{(4^1-4^0)^3} &&= \frac{(8 \times 3^2)^2}{3^3} \\
 &= \frac{(64+8)^2}{3^3} &&= \frac{8^2 \times 3^4}{3^3} \\
 &= \frac{72^2}{3^3} &&= 8^2 \times 3 \\
 &&&= 192
 \end{aligned}$$

$$\begin{aligned}
 2. \quad \forall n \in \mathbb{N}, B(n) &= \frac{(8^{n+1}+8^n)^2}{(4^n-4^{n-1})^3} &&= \frac{(2^3)^{2n} \times (3^2)^2}{(2^2)^{3n-3} \times 3^3} \\
 &= \frac{[8^n(8+1)]^2}{[4^{n-1}(4-1)]^3} &&= \frac{2^{6n} \times 3^4}{2^{6n-6} \times 3^3} \\
 &= \frac{8^{2n} \times 9^2}{4^{3n-3} \times 3^3} &&= 2^6 \times 3 \\
 &&&= 192 \text{ donc } B(n) \text{ ne dépend pas de } n \text{ et est toujours égal à } 192
 \end{aligned}$$

Exercice 5

$$\begin{aligned}
 A &= \sqrt{27} + 2\sqrt{75} - \sqrt{108} \\
 A &= 3\sqrt{3} + 2 \times 5\sqrt{3} - 6\sqrt{3} \\
 A &= 7\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 B &= \sqrt{150} + \sqrt{96} - 4\sqrt{24} \\
 B &= \sqrt{2 \times 5^2 \times 3} + \sqrt{2^5 \times 3} - 4\sqrt{2^3 \times 3} \\
 B &= 5\sqrt{2 \times 3} + 2^2\sqrt{2 \times 3} - 4 \times 2\sqrt{2 \times 3} \\
 B &= 5\sqrt{6} + 4\sqrt{6} - 8\sqrt{6} \\
 B &= \sqrt{6}
 \end{aligned}$$

Exercice 6

$A = \frac{2}{\sqrt{3}}$	$B = \frac{-8}{\sqrt{2}}$	$C = \frac{5}{\sqrt{6}-1}$	$D = \frac{1-\sqrt{3}}{1+\sqrt{3}}$	$E = \frac{1+\sqrt{3}}{2+2\sqrt{3}}$
$A = \frac{2 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}}$	$B = \frac{-8 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}}$	$C = \frac{5(\sqrt{6}+1)}{(\sqrt{6}-1)(\sqrt{6}+1)}$	$D = \frac{(1-\sqrt{3})(1-\sqrt{3})}{(1+\sqrt{3})(1-\sqrt{3})}$	$E = \frac{1+\sqrt{3}}{2(1+\sqrt{3})}$
$A = \frac{2\sqrt{3}}{3}$	$B = \frac{-8\sqrt{2}}{2}$	$C = \frac{5(\sqrt{6}+1)}{5}$	$D = \frac{1-2\sqrt{3}+3}{-2}$	$E = \frac{1}{2}$
	$B = -4\sqrt{2}$	$C = \sqrt{6} + 1$	$D = \frac{4-2\sqrt{3}}{-2}$	
			$D = \sqrt{3} - 2$	

Exercice 7

$A = \sqrt{(-5)^2}$	$B = \sqrt{(1-\sqrt{3})^2}$	$C = (\sqrt{2\sqrt{3}})^4$	$D = \left(\frac{5-\sqrt{2}}{\sqrt{3}}\right)^2$
$A = -5 $	$B = 1-\sqrt{3} $	$C = (2\sqrt{3})^2$	$D = \frac{25-1-\sqrt{2}+2}{3}$
$A = 5$	$B = -(1-\sqrt{3})$	$C = 2^2 \times \sqrt{3}^2$	$D = \frac{27-10\sqrt{2}}{3}$
	$B = \sqrt{3} - 1$	$C = 12$	

Exercice 8

$A = (3x - 4)(6x - 1)$ $A = 18x^2 - 3x - 24x + 4$ $A = 18x^2 - 27x + 4$	$B = (-2x + 3)(4x - 3)$ $B = -8x^2 + 6x + 12x - 9$ $B = -8x^2 + 18x - 9$	$C = 2(3x + 1)(5x - 2)$ $C = 2(15x^2 - 6x + 5x - 2)$ $C = 30x^2 - 2x - 4$
$D = -7(2x - 3)(4x - 9)$ $D = -7(8x^2 - 18x - 12x + 27)$ $D = -53x^2 + 210x - 189$	$E = x(2 - 3x) + 6x^2 + 3x$ $E = 2x - 3x^2 + 6x^2 + 3x$ $E = 3x^2 + 5x$	
$F = (5 - x)(1 + 2x) + (2x + 3)(4x + 8)$ $F = 5 + 10x - x - 2x^2 + 8x^2 + 16x + 12x + 24$ $F = 6x^2 + 37x + 29$	$G = (7x - 2)(2x + 6) - 4(3x - 7)(x - 5)$ $G = 14x^2 + 42x - 4x - 12 - 4(3x^2 - 15x - 7x + 35)$ $G = 2x^2 + 126x - 152$	
$H = (2a^3 - 7b)(-7a + 3b^2)$ $H = -14a^4 + 6a^3b^2 + 49ab - 21b^3$	$J = (2x - 5)^2$ $J = 4x^2 - 20x + 25$	
$K = (4x + 9)^2$ $K = 16x^2 + 72x + 81$	$L = (3x^2 - \frac{1}{3}x)^2$ $L = 9x^4 - 2x^3 + \frac{1}{9}x^2$	$M = (3x - \sqrt{5})^2$ $M = 9x^2 - 6\sqrt{5}x + 5$
$N = (x + \frac{3}{5})(x - \frac{3}{5})$ $N = x^2 - \frac{9}{25}$	$P = (\frac{5}{4}x + \frac{2}{7})(\frac{5}{4}x - \frac{2}{7})$ $P = \frac{25}{16}x^2 - \frac{4}{49}$	$Q = (3x - \frac{1}{\sqrt{3}})^2$ $Q = 9x^2 - 2 \times 3x \times \frac{1}{\sqrt{3}} + \frac{1}{3}$ $Q = 9x^2 - 2\sqrt{3}x + \frac{1}{3}$
$R = (2x + 3)^3$ $R = (2x)^3 + 3 \times (2x)^2 \times 3 + 3 \times 2x \times 3^2 + 3^3$ $R = 8x^3 + 36x^2 + 54x + 27$	$S = (2x - 3)^3$ $S = (2x)^3 - 3 \times (2x)^2 \times 3 + 3 \times 2x \times 3^2 - 3^3$ $S = 8x^3 - 36x^2 + 54x - 27$	
$T = (x + a)(x - a)(x^2 - a^2)$ $T = (x^2 - a^2)(x^2 - a^2)$ $T = (x^2 - a^2)^2$ $T = x^4 - 2a^2x^2 + a^4$	$U = (2a - 1)(2a + 1)(4a^2 + 1)$ $U = (4a^2 - 1)(4a^2 + 1)$ $U = 16a^4 - 1$	
$V = [(x - 1) + x^2][(x - 1) - x^2]$ $V = (x - 1)^2 - x^4$ $V = x^2 - 2x + 1 - x^4$ $V = -x^4 + x^2 - 2x + 1$	$W = (a^2 - ab + b^2)(a^2 + ab + b^2)$ $W = a^4 + a^3b + a^2b^2 - a^3b - a^2b^2 - ab^3 + a^2b^2 + ab^3 + b^4$ $W = a^4 + a^2b^2 + b^4$	
$X = (4a^{3n} + 3a^{2n})(4a^{3n} - 3a^{2n})$ $X = (4a^{3n})^2 - (3a^{2n})^2$ $X = 16a^{6n} - 9a^{4n}$	$Y = (2a^n - a^{n+1})^2$ $Y = (2a^n - a^{n+1})^2$ $Y = (2a^n)^2 - 2 \times 2a^n \times a^{n+1} + (a^{n+1})^2$ $Y = 4a^{2n} - 4a^{2n+1} + a^{2n+2}$	

Exercice 9

$A = 4(x - 1) + (x - 1)(2x + 1)$ $A = (x - 1)[4 + (2x + 1)]$ $A = (x - 1)(2x + 5)$	$B = (x + 5)^2 + (x - 5)(x + 5) - 3(x + 5)$ $B = (x + 5)[(x + 5) + (x - 5) - 3]$ $B = (x + 5)(2x - 3)$
$C = 5(2x - 1)^3 + (2x - 1)^2(x + 2)$ $C = (2x - 1)^2[5(2x - 1) + (x + 2)]$ $C = (2x - 1)^2(10x - 5 + x + 2)$ $C = (2x - 1)^2(11x - 3)$	$D = (2x - 3)^2 + 5x(3 - 2x)$ $D = (2x - 3)^2 - 5x(2x - 3)$ $D = (2x - 3)(2x - 3 - 5x)$ $D = (2x - 3)(-3x - 3)$ $D = -3(2x - 3)(x + 1)$
$E = 2x + 5 - (x + 3)(4x + 10)$ $E = 2x + 5 - 2(x + 3)(2x + 5)$ $E = (2x + 5)[1 - 2(x + 3)]$ $E = (2x + 5)(1 - 2x - 6)$ $E = (2x + 5)(-2x - 5)$	$F = 1 - 12x + 36x^2$ $F = (6x - 1)^2$
$G = (3x - 1)^2 - 25$ $G = (3x - 1 - 5)(3x - 1 + 5)$ $G = (3x - 6)(3x + 4)$ $G = 3(x - 2)(3x + 4)$	$H = (2x + 3)^2 - (x - 1)^2$ $H = [(2x + 3) + (x - 1)][(2x + 3) - (x - 1)]$ $H = [2x + 3 + x - 1][2x + 3 - x + 1]$ $H = (3x + 2)(x + 4)$

$$I = 4x^2 - 20x + 25$$

$$I = (2x - 5)^2$$

$$J = 2x^2 + 20x + 50$$

$$J = 2(x^2 + 10x + 25)$$

$$J = 2(x + 5)^2$$

$$K = \frac{4}{9} - (2x + \frac{1}{3})^2$$

$$K = \left[\frac{2}{3} + (2x + \frac{1}{3}) \right] \left[\frac{2}{3} - (2x + \frac{1}{3}) \right]$$

$$K = (2x + 1)(-2x - \frac{1}{3})$$

$$L = x^2 - 9 + (x - 3)(2x + 5)$$

$$L = (x + 3)(x - 3) + (x - 3)(2x + 5)$$

$$L = (x - 3)[(x + 3) + (2x + 5)]$$

$$L = (x - 3)(3x + 8)$$

$$M = (2x - 3)^2 - (6 - 4x)(6x + 1)$$

$$M = (2x - 3)^2 - 2(3 - 2x)(6x + 1)$$

$$M = (2x - 3)^2 + 2(2x - 3)(6x + 1)$$

$$M = (2x - 3)[2x - 3 + 2(6x + 1)]$$

$$M = (2x - 3)(14x - 1)$$

$$N = 4x^2 - 4x + 1 + (4 - 8x)(3x + 2)$$

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

$$N = (2x - 1)(2x - 1 - 12x - 8)$$

$$N = (2x - 1)(-10x - 9)$$

$$P = (25x^2 + 1 - 10x) - 9x^2$$

$$P = (5x - 1)^2 - 9x^2$$

$$P = (5x - 1 + 3x)(5x - 1 - 3x)$$

$$P = (8x - 1)(2x - 1)$$

Exercice 10

$$A = \frac{2x}{x-1} + 4 \quad \text{défini pour tout } x \in \mathbb{R} \setminus \{1\}$$

$$A = \frac{2x}{x-1} + \frac{4(x-1)}{x-1}$$

$$A = \frac{2x+4x-4}{x-1}$$

$$A = \frac{6x-4}{x-1}$$

$$C = \frac{3}{x-4} + \frac{2}{x} \quad \text{défini pour tout } x \in \mathbb{R} \setminus \{0; 4\}$$

$$C = \frac{3x}{x(x-4)} + \frac{2(x-4)}{x(x-4)}$$

$$C = \frac{5x-8}{x(x-4)}$$

$$E = \frac{3x+3}{3x-1} - \frac{2x}{2x+1} \quad \text{défini pour tout } x \in \mathbb{R} \setminus \left\{ -\frac{1}{2}; \frac{1}{3} \right\}$$

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

$$E = \frac{6x^2+9x+3-6x^2+2x}{(3x-1)(2x+1)}$$

$$E = \frac{11x+3}{(3x-1)(2x+1)}$$

$$G = \frac{a^3-b^3}{(a-b)^2} - \frac{(a+b)^2}{a-b} \quad \text{défini pour tout } a, b \in \mathbb{R} \text{ et } a \neq b$$

$$G = \frac{a^3-b^3}{(a-b)^2} - \frac{(a+b)^2(a-b)}{(a-b)^2}$$

$$G = \frac{a^3-b^3-(a^2+2ab+a^2)(a-b)}{(a-b)^2}$$

$$G = \frac{a^3-b^3-a^3+a^2b-2a^2b+2ab^2-ab^2+b^3}{(a-b)^2}$$

$$G = \frac{-a^2b+ab^2}{(a-b)^2}$$

$$G = \frac{-ab(a-b)}{(a-b)^2}$$

$$G = \frac{-ab}{a-b}$$

$$B = \frac{3x-2}{x-2} - \frac{2}{3} \quad \text{défini pour tout } x \in \mathbb{R} \setminus \{2\}$$

$$B = \frac{3(3x-2)}{3(x-2)} - \frac{2(x-2)}{3(x-2)}$$

$$B = \frac{9x-6-2x+4}{3(x-2)}$$

$$B = \frac{7x-2}{3(x-2)}$$

$$D = \frac{1}{x-3} - \frac{2}{x} \quad \text{défini pour tout } x \in \mathbb{R} \setminus \{0; 3\}$$

$$D = \frac{x}{x(x-3)} - \frac{2(x-3)}{x(x-3)}$$

$$D = \frac{-x+6}{x(x-3)}$$

$$F = \frac{1}{(x+1)^2} + \frac{1}{x+1} - \frac{1}{x} \quad \text{défini pour tout } x \in \mathbb{R} \setminus \{-1; 0\}$$

$$F = \frac{x}{x(x+1)^2} + \frac{x(x+1)}{(x+1)^2} - \frac{(x+1)^2}{x(x+1)^2}$$

$$F = \frac{x+x^2+x-x^2-2x-1}{x(x+1)^2}$$

$$F = \frac{-1}{x(x+1)^2}$$

$$H = \frac{\frac{6(n+1)}{n(n-1)(2n-2)}}{\frac{2n+2}{n^2(n-1)^2}} \quad \text{défini pour tout } n \in \mathbb{R} \setminus \{0; 1\}$$

$$H = \frac{6(n+1)}{n(n-1)(2n-2)} \times \frac{n^2(n-1)^2}{2n+2}$$

$$H = \frac{3}{2}n$$

$$I = \frac{2}{x+2} - \frac{1}{x-2} + \frac{8}{x^2-4} \text{ défini pour tout } x \in \mathbb{R} \setminus \{-2; 2\}$$

$$I = \frac{2(x-2)}{x^2-4} - \frac{x+2}{x^2-4} + \frac{8}{x^2-4}$$

$$I = \frac{2x-4-x-2+8}{x^2-4}$$

$$I = \frac{x+2}{(x+2)(x-2)}$$

$$I = \frac{1}{x-2}$$

$$J = \frac{1}{x} + \frac{x+2}{x^2-4} + \frac{2}{x^2-2x}$$

défini pour tout $x \in \mathbb{R} \setminus \{-2; 0; 2\}$

$$J = \frac{1}{x} + \frac{x+2}{(x+2)(x-2)} + \frac{2}{x(x-2)}$$

$$J = \frac{(x+2)(x-2)+x(x+2)+2(x+2)}{x(x+2)(x-2)}$$

$$J = \frac{x^2-4+x^2+2x+2x+4}{x(x+2)(x-2)}$$

$$J = \frac{2x^2+4x}{x(x+2)(x-2)}$$

$$J = \frac{2x(x+2)}{x(x+2)(x-2)}$$

$$J = \frac{2}{x-2}$$