Exercice 1

(1) $\big(5a^2 - 11b^3\big)^2 = 25a^4 - 110a^2b^3 + 121b^6$

(2) $\left(\frac{x}{7} + \frac{3y}{8}\right)\left(\frac{3y}{8} - \frac{x}{7}\right) = \left(\frac{3y}{8} + \frac{x}{7}\right)\left(\frac{3y}{8} - \frac{x}{7}\right) = \frac{9y^2}{64} - \frac{x^2}{49}$

(3) $\left(x - 3y + \frac{5}{2}z\right)\left(-\frac{2}{3}x - y + z\right)$

$= -\frac{2}{3}x^2 - xy + xz + 2xy + 3y^2 - 3yz - \frac{5}{3}xz - \frac{5}{2}yz + \frac{5}{2}z^2$

$= -\frac{2}{3}x^2 + xy - \frac{2}{3}xz + 3y^2 - \frac{11}{2}yz + \frac{5}{2}z^2$

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

$= 1 - 6x + 9x^2 - 2\big(4x^2 + 8x - x - 2\big)$

$= 1 - 6x + 9x^2 - 8x^2 - 16x + 2x + 4$

$= x^2 - 20x + 5$

Exercice 2

(1) $24x^2y^3\,(x - 2y) - 40x^3y^2\,(7x + 4y)$

$= 8x^2y^2\,[3y(x - 2y) - 5x(7x + 4y)]$

$= 8x^2y^2\,\big(3xy - 6y^2 - 35x^2 - 20xy\big)$

$= 8x^2y^2\,\big(-17xy - 6y^2 - 35x^2\big)$

$= -8x^2y^2\,\big(17xy + 6y^2 + 35x^2\big)$

(2) $(4a - 8b)(a - b) - (2a - b)(10a - 20b)$

$= 4(a - 2b)(a - b) - 10(2a - b)(a - 2b)$

$= (a - 2b)[4(a - b) - 10(2a - b)]$

$= (a - 2b)[4a - 4b - 20a + 10b]$

$= (a - 2b)(-16a + 6b)$

$= 2(a - 2b)(-8a + 3b)$

(3) $(a - b)(z - 1) - (b - a)(3z + 5)$

$= (a - b)(z - 1) + (a - b)(3z + 5)$

$= (a - b)[(z - 1) + (3z + 5)]$

$= (a - b)(4z + 4)$

$= 4(a - b)(z + 1)$

(4) $a^2 - 2b = 2a \cdot \left(\frac{a}{2} - \frac{b}{a}\right)$

(5) $\frac{x}{3} - \frac{y}{2} = \frac{1}{6} \cdot (2x - 3y)$

(6) $2x + 4y - z + 3a = -2\left(-x - 2y + \frac{z}{2} - \frac{3a}{2}\right)$

Exercice 3

(1) $\frac{x}{2} - 3\left(\frac{x+4}{7} - \frac{1}{9}\right) = 0$

$\Leftrightarrow \frac{x}{2} - \frac{3x+12}{7} + \frac{1}{3} = 0$

$\Leftrightarrow \frac{21x}{42} - \frac{18x+72}{42} + \frac{14}{42} = 0 \,/\cdot\, 42$

$\Leftrightarrow 21x - 18x - 72 + 14 = 0$

$\Leftrightarrow 3x - 58 = 0$

$\Leftrightarrow 3x = 58$

$\Leftrightarrow x = \frac{58}{3}$

$S = \left\{\frac{58}{3}\right\}$

(2) $x(x+2) - 3x(x-4) = -6x\left(\frac{x}{3} - 1\right) + 24$

$\Leftrightarrow x^2 + 2x - 3x^2 + 12x = -2x^2 + 6x + 24$

$\Leftrightarrow \cancel{-2x^2} + 14x = \cancel{-2x^2} + 6x + 24$

$\Leftrightarrow 14x = 6x + 24$

$\Leftrightarrow 14x - 6x = 24$

$\Leftrightarrow 8x = 24$

$\Leftrightarrow x = 3$

$S = \{3\}$

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