

## EXERCICES

— Effectuer les produits suivants :

$$\bullet 443. \left(3a^4b^3\right) \left(\frac{2}{3}ab^3\right).$$

$$\bullet 445. \left(\frac{4}{7}a^2xy^3\right) \left(-\frac{5}{2}a^2y^4\right).$$

$$\bullet 447. \left(\frac{9}{4}a^4x^2y^3\right) \left(-\frac{4}{3}ax^2\right).$$

$$\bullet 449. \left(-\frac{7}{2}ax^3y\right) \left(-\frac{8}{15}b^3xy^2\right) \left(\frac{5}{21}abx^3\right).$$

$$\bullet 451. \left(\frac{5}{12}a^4b^2x\right) \left(-\frac{2}{7}ax^3y^2\right) \left(-\frac{14}{5}b^3xy^4\right).$$

— Calculer les expressions suivantes :

$$\bullet 453. \left(-\frac{2}{5}ab^3\right)^2.$$

$$\bullet 454. \left(\frac{5}{3}a^2b^3x^4\right)^2.$$

$$\bullet 456. \left(\frac{7}{2}a^3b^5x^3\right)^2.$$

$$\bullet 444. \left(\frac{4}{5}a^2b^2c\right) \left(-\frac{3}{4}abc^4\right).$$

$$\bullet 446. \left(-\frac{3}{4}x^2y\right) \left(+\frac{3}{5}a^2y^3\right).$$

$$\bullet 448. \left(\frac{14}{3}a^2b^3x\right) \left(-\frac{6}{7}a^2b^4\right).$$

$$\bullet 450. \left(-\frac{2}{3}xy^2\right)^3 (-4x^2y).$$

$$\bullet 452. \left(\frac{3}{5}x^2y\right)^3 \left(-\frac{5}{4}xy\right).$$

— Effectuer les produits suivants :

$$\bullet 459. \left(\frac{3}{2}a^2b - \frac{5}{4}ab + 3a\right) \left(-\frac{4}{3}a^2b^3\right).$$

$$\bullet 461. \left(\frac{2}{5}a^4x - 3ay - 4by\right) (4a^4x^2y).$$

$$\bullet 463. (2x - 3y)(4x - 2).$$

$$\bullet 465. (-4x + 3y + 1)(y - 3).$$

$$\bullet 467. (2x^3 - 3y^4 + 5)(x^2 - y).$$

$$\bullet 469. (5xy + 3x - 2y)(2x - y).$$

$$\bullet 471. (14a^3b + 5a^2 - b)(a^2 - 2b).$$

$$\bullet 473. Soient les polynômes : A = -2x^2 + 3x - 5 \text{ et } B = x^2 - x + 3.$$

1<sup>o</sup> Calculer le produit A.B,

2<sup>o</sup> Vérifier, pour  $x = -3$  en calculant les valeurs numériques de A, B et du produit A.B.

• 474. Soit le polynôme : A =  $x^2 - 3x + 2$ .

1<sup>o</sup> Calculer le carré, puis le cube de ce polynôme.

2<sup>o</sup> Vérifier pour  $x = -4$ , en calculant les valeurs numériques du polynôme et des résultats trouvés.

— Effectuer les produits suivants, réduire et ordonner les résultats :

$$\bullet 476. (2x - 7)(-3x + 2).$$

$$\bullet 477. (5x^2 - 2x)(3x - 4x^3).$$

$$\bullet 479. \left(-2x + \frac{3}{2}\right) (4x + 3).$$

$$\bullet 481. (7x^4 - 2x^3 + 4x^2)(3x^3 - 5).$$

$$\bullet 483. (2x^2 - 4 + 2x)(x^2 + 5 - 2x).$$

$$\bullet 476. (4x^4 + 7 - 2x^3)(x^2 - 2x).$$

$$\bullet 478. (2x - 7x^2 + 5x^3)(3x - 5x^2 + 8).$$

$$\bullet 480. \left(\frac{8}{3}x - \frac{3}{2}x^2 + 5\right) (4x^3 - 5x^2 + 7).$$

$$\bullet 482. (2x^2 - 4x^4)(x^2 - 2x).$$

$$\bullet 484. \left(\frac{5}{4}x^3 - 2x + \frac{1}{2}\right) \left(\frac{7}{2}x^2 - \frac{2}{3}x + x^2\right).$$

— Calculer les expressions suivantes :

$$\bullet 485. (2x + 3)(3x + 2)(x - 4).$$

$$\bullet 487. (3x^2 - 1)(x + 1)(x - 1).$$

$$\bullet 489. (2x^2 + 3x - 4)^2.$$

$$\bullet 491. (7x - 5)^3.$$

$$\bullet 486. (5x - 1)(2x + 3)(7 + 4x).$$

$$\bullet 488. \left(x - \frac{3}{5}\right) (5x^2 - 1)(5x + 3).$$

$$\bullet 490. (4x^2 - 7x + 2x^4 + 5)^2.$$

$$\bullet 492. (x^4 - x + 2)^3.$$

— Développer et réduire les expressions suivantes :

$$\bullet 493. 5(3a^2 - 4b^2) - [9(2a^2 - b^2) - 2(a^2 - 5b^2)].$$

$$\bullet 494. 3a^2(2b - 1) - [2a^2(5b - 3) - 2b(3a^2 + 1)].$$

$$\bullet 495. (2a + 5b)(3a - 2b) - (2a - 1)(3a + 2b) - (a - 2b)(5b - 1).$$

$$\bullet 496. (2x - 3y)(5x - 2y) - (3x - 2y)(2x + 1) - (5x - y)(3y + 1).$$

$$\bullet 497. (ax^2 - b)(ax^2 - 2b) + 3b(ax^2 - b) + b(b - 1).$$

$$\bullet 498. (x - 1)(x - 2)(x - 3) + 6(x - 1)(x - 2) + 7(x - 1).$$

$$\bullet 499. (x^2 + y^2)(x^2 - y^2)(x - y) + xy(x^2 + y^2).$$

$$\bullet 500. \frac{2}{3}x^2y \left(2x^2 - \frac{y}{3}\right) - 2x^4(2x^2 - 1) + \left(2x^2 - \frac{y}{3}\right) (2x^2 - 1).$$

Exercices de calcul: correction

$$443: \left(3a^3b^3\right) \left(\frac{2}{3}ab^5\right) = \left(3 \times \frac{2}{3}\right) a^2 a^3 b^3 b^5 = 2 \cdot a^3 b^8.$$

$$444: \left(\frac{4}{5}a^3b^2c\right) \left(-\frac{3}{4}abc^4\right) = \left(\frac{4}{5} \times -\frac{3}{4}\right) a^3 a b^2 b c c^4 = \frac{-4 \times 3}{5 \times 4} a^4 b^3 c^5 = -\frac{3}{5} a^4 b^3 c^5.$$

$$445: \left(\frac{4}{7}a^2xy^3\right) \left(-\frac{5}{2}a^3y^4\right) = \left(\frac{4}{7} \times -\frac{5}{2}\right) a^2 a^3 x y^3 y^4 = \frac{-4 \times 5}{7 \times 2} a^5 x y^7 = -\frac{10}{7} a^5 x y^7.$$

$$446: \left(-\frac{3}{4}x^2y\right) \left(\frac{3}{5}a^3y^5\right) = \left(-\frac{3}{4} \times \frac{3}{5}\right) a^3 x^2 y y^5 = -\frac{9}{20} a^3 x^2 y^6.$$

$$447: \left(\frac{9}{4}a^4x^2y^3\right) \left(-\frac{4}{3}ax^2\right) = \left(\frac{9}{4} \times -\frac{4}{3}\right) a a x x^2 y^3 = -\frac{9}{3} a^5 x^4 y^3 = -3 a^5 x^4 y^3.$$

$$448: \left(\frac{14}{3}a^2b^3x\right) \left(-\frac{6}{7}a^2b^5\right) = -\frac{14 \times 6}{3 \times 7} a^2 a^2 b^3 b^5 x = -4 a^4 b^8 x.$$

$$449: \left(-\frac{7}{2}ax^2y\right) \left(-\frac{8}{15}b^3x^2y^2\right) \left(\frac{5}{21}abx^3\right) = \left(-\frac{7}{2} \times -\frac{8}{15} \times \frac{5}{21}\right) a a b^3 b x x^2 x^3 y y^2 \\ = + \frac{7 \times 8 \times 5}{2 \times 15 \times 21} a^2 b^4 x^6 y^3 \\ = \frac{\cancel{7} \cancel{2} \cancel{5} \cancel{1}}{\cancel{2} \times \cancel{3} \times \cancel{5} \times \cancel{3} \times \cancel{7}} a^2 b^4 x^6 y^3 = \frac{4}{9} a^2 b^4 x^6 y^3.$$

$$450: \left(\frac{2}{3}xy^2\right)^2 (-4x^2y) = \left(\frac{2}{3}xy^2\right) \left(\frac{2}{3}xy^2\right) (-4x^2y) = \frac{(2)(2)(-4)}{3 \times 3} x x x x^2 y^2 y^2 y \\ = -\frac{8}{9} x^6 y^5.$$

$$451: \left(\frac{5}{12}a^2b^2x\right) \left(-\frac{2}{7}axy^3\right) \left(-\frac{14}{5}b^3xy^4\right) = \frac{5 \times (-2) \times (-14)}{12 \times 7 \times 5} a^4 a b^2 b x x^2 x y^3 y^4 \\ = \frac{\cancel{5} \cancel{2} \cancel{1} \cancel{4}}{\cancel{2} \times \cancel{3} \times \cancel{7}} a^5 b^2 x^4 y^7 = \frac{1}{3} a^5 b^2 x^4 y^7.$$

$$452: \left(\frac{3}{5}x^3y\right)^3 \left(-\frac{5}{4}xy\right) = \frac{3 \times 3 \times 3}{5 \times 5 \times 5} \times -\frac{5}{4} x^2 x^2 x^2 y y y x y = \frac{-27}{100} x^7 y^4.$$

$$453. \left(-\frac{2}{5}ab^3\right)^2 = \left(-\frac{2}{5}ab^3\right) \left(-\frac{2}{5}ab^3\right) = \frac{4}{25}a^2b^6.$$

$$454. \left(\frac{5}{3}a^2b^3x^4\right)^2 = \left(\frac{5}{3}a^2b^3x^4\right) \left(\frac{5}{3}a^2b^3x^4\right) = \frac{25}{9}a^4b^6x^8.$$

$$455. \left(\frac{-3}{2}a^4b^3y^3\right)^3 = \left(\frac{-3}{2}a^4\right)^3 \left(b^3\right)^3 \left(y^3\right)^3 = \frac{-27}{8}a^{12}b^9y^9.$$

$$456. \left(\frac{7}{2}a^3b^5x^3\right)^3 = \frac{49}{4}a^6b^{10}x^6$$

$$457. \left(\frac{-3}{4}a^4b^2x^5\right)^2 = \frac{36}{16}a^8b^4x^{10}.$$

$$458. \left(-\frac{6}{5}ax^4y^5\right)^3 = \frac{(-6)^3}{5^3}a^3(x^4)^3(y^5)^3 = \frac{-216}{125}a^3x^{12}y^{15}.$$

$$459. \left(\frac{3}{2}a^2b - \frac{5}{4}ab + 3a\right) \left(-\frac{4}{3}a^2b^3\right) = \left(\frac{3}{2}a^2b\right) \left(-\frac{4}{3}a^2b^3\right) + \left(\frac{-5}{4}ab\right) \left(-\frac{4}{3}a^2b^3\right) + (3a) \left(-\frac{4}{3}a^2b^3\right)$$

$$= \left(\frac{3}{2} \times -\frac{4}{3}\right)a^2b^2a^2b^3 + \left(\frac{-5}{4} \times -\frac{4}{3}\right)a^2ba^2b^3 + \left(3 \times -\frac{4}{3}\right)a^2b^3$$

$$= -2a^4b^4 + \frac{5}{3}a^3b^4 - 4a^3b^3$$

$$460. \left(\frac{5}{4}ax^2 + \frac{3}{2}bx - 4c\right) \left(-\frac{4}{5}abx^5\right) = \left(\frac{5}{4}ax^2\right) \left(-\frac{4}{5}abx^5\right) + \left(\frac{3}{2}bx\right) \left(-\frac{4}{5}abx^5\right) + (-4c) \left(-\frac{4}{5}abx^5\right)$$

$$= \left(\frac{5}{4} \times -\frac{4}{5}\right)ax^2abx^5 + \left(\frac{3}{2} \times -\frac{4}{5}\right)bxabx^5 + \left(4 \times \frac{4}{5}\right)cabx^5$$

$$= -a^2bx^7 - \frac{6}{5}ab^2x^6 + \frac{16}{5}abcx^5$$

$$461. \left(\frac{2}{5}a^2x - 3ay - 4by\right) \left(4a^3x^2y\right) = \left(\frac{2}{5} \times 4\right)(a^2x)(a^3x^2y) - (3 \times 4)aya^3x^2y - 4 \times 4bya^3x^2y$$

$$= \frac{8}{5}a^5x^3y - 12a^4x^3y^2 - 16a^3b^2x^2y^2$$

$$462. \left(-\frac{3}{2}x^5 + \frac{15}{4}x^3 - \frac{3}{5}x\right) \left(-\frac{20}{3}x^4\right) = \left(-\frac{3}{2}x^5\right) \left(-\frac{20}{3}x^4\right) + \left(\frac{15}{4}x^3\right) \left(-\frac{20}{3}x^4\right) + \left(-\frac{3}{5}x\right) \left(-\frac{20}{3}x^4\right)$$

$$= +10x^9 - 25x^7 + \frac{8}{3}x^5.$$

$$463. (2x - 3y)(4x - 2) = \cancel{2x} \cdot x + \cancel{2x} \cdot (-2) + (-3y)(4x) + (-3y)(-2)$$

$$= 8x^2 - 4x - 12xy + 6y.$$

$$464. (2a + 3b)(-4a + 6b) = \cancel{2a} \cdot (-4a) + \cancel{2a} \cdot 6b + \cancel{3b} \cdot (-4a) + \cancel{3b} \cdot 6b$$

$$= -8a^2 + 12ab - 12ab + 18b^2$$

$$= -8a^2 + 18b^2.$$

$$465. (-4x + 3y + 1)(y - 3) = (-4x)y + (3y)y + 1y + (-4x)(-3) + 3y(-3) + 1(-3)$$

$$= -4xy + 3y^2 + y + 12x - 9y - 3$$

$$= 12x - 4xy + y - 9y + 3y^2 - 3$$

$$= 12x - 4xy - 8y + 3y^2 - 3.$$

$$466. (-2a + 3b - 5)(a - b) = \cancel{-2a}a + (-2a)(-b) + \cancel{3b}a + \cancel{3b}(-b) + (-5)a + (-5)(-b)$$

$$= -2a^2 + 2ab + 3ab - 3b^2 - 5a + 5b$$

$$= -2a^2 + 5ab - 3b^2 - 5a + 5b.$$

$$467. (2x^3 - 3y^2 + 5)(x^2 - y) = 2x^3 \cdot x^3 + 2x^3 \cdot (-y) + (-3y^2)x^3 + (-3y^2)(-y) + 5x^2 + 5(-y)$$

$$= 2x^5 - 2x^3y - 3x^2y^2 + 3y^4 + 5x^2 - 5y.$$

$$468. (4a^3 - 5b^4 + ab)(a^2 - b) = 4a^3 \cdot a^2 + 4a^3(-b) + (-5b^4)a^2 + (-5b^4)(-b) + ab a^2 + ab(-b)$$

$$= 4a^5 - 4a^3b - 5a^2b^4 + 5b^5 + a^3b - ab^2$$

$$= 4a^5 - 4a^3b + a^3b - 5a^2b^4 - ab^2 + 5b^5$$

$$= 4a^5 - 3a^3b - 5a^2b^4 - ab^2 + 5b^5.$$

$$469. (5xy + 3x - 2y)(2x - y) = 5xy \cdot 2x + 5xy(-y) + 3x \cdot 2x + 3x(-y) + (-2y)(2x) + (-2y)(-y)$$

$$= 10x^2y - 5xy^2 + 6x^2 - 3xy - 4xy - 2y^2$$

$$= 10x^2y + 6x^2 - 5xy^2 - 7xy - 2y^2.$$

$$470. (-3xy + 4x - 2y)(x + 5) = (-3xy)x + (-3xy)5 + (4x)x + (4x)5 + (-2y)x + (-2y)5$$

$$= -3x^2y - 15xy + 4x^2 + 20x - 2xy - 10y$$

$$= -3x^2y + 4x^2 - 17xy + 20x - 10y.$$

$$471. (14a^2b + 5a^2 - b)(a^2 - 2b) = (14a^2b)a^2 + (14a^2b)(-2b) + 5a^2a^2 + 5a^2(-2b) + (-b)a^2 + (-b)(-2b)$$

$$= 14a^4b - 28a^2b^2 + 5a^4 - 10a^2b - a^2b + 2b^2$$

$$= 14a^4b + 5a^4 - 28a^2b^2 - 11a^2b + 2b^2$$

$$472. (7a^3b - 4b^3 + 2a^3)(2a^3 + 4b^2) = (7a^3b)(2a^3) + (7a^3b)(4b^2) + (-4b^3)2a^3 + (-4b^3)4b^2 + 2a^3 \cdot 2a^3 + 2a^3 \cdot 4b^2$$

$$= 14a^6b + 28a^3b^3 - 8a^3b^2 - 16b^4 + 4a^6 + 8a^3b^2$$

$$= 14a^6b + 28a^3b^3 - 16b^4 + 4a^6.$$

$$473. 1) A = -2x^2 + 3x + 5 \quad \text{et} \quad B = x^2 - x + 3$$

$$\text{donc } AB = (-2x^2 + 3x + 5)(x^2 - x + 3)$$

$$= (-2x^2)x^2 + (-2x^2)(-x) + (-2x^2)3 + 3x \cdot x^2 + 3x \cdot (-x) + 3x \cdot 3$$

$$+ 5 \cdot x^2 + 5 \cdot (-x) + 5 \cdot 3$$

$$= -2x^4 + 2x^3 - 6x^2 + 3x^3 - 3x^2 + 9x + 5x^2 - 5x + 15$$

$$= -2x^4 + 2x^3 + 3x^3 - 6x^2 - 3x^2 + 5x^2 + 9x - 5x + 15$$

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

$$2) \text{ Pour } x = -3: \quad A = -2x(-3)^2 + 3x(-3) + 5 \quad B = (-3)^3 - (-3) + 3$$

$$= -2 \cdot 9 - 9 + 5 \quad = 9 + 3 + 3$$

$$= -18 - 4 \quad = 15$$

$$= -22$$

$$\text{donc } AB = (-22) \cdot (15) = -330.$$

$$\text{D'autre part: } -2x^4 + 5x^3 - 4x^2 + 4x + 15$$

$$= -2x(-3)^4 + 5x(-3)^3 - 4x(-3)^2 + 4x(-3) + 15$$

$$= -2 \cdot 81 + 5 \cdot (-27) - 4 \cdot 9 - 12 + 15$$

$$= -162 - 135 - 36 - 12 + 15$$

$$= -330.$$

$$474. 1) A^2 = (x^2 - 3x + 2)(x^2 - 3x + 2)$$

$$= x^2 \cdot x^2 + x^2 \cdot (-3x) + x^2 \cdot 2 + (-3x) \cdot x^2 + (-3x) \cdot (-3x) + (-3x) \cdot 2 + 2x^2 \cdot 2 + 2x^2 \cdot (-3x) + 2 \cdot 2$$

$$= x^4 - 3x^3 + 2x^2 - 3x^3 + 9x^2 - 6x + 2x^2 - 6x + 4$$

$$= x^4 - 3x^3 - 3x^3 + 2x^2 + 9x^2 + 2x^2 - 6x - 6x + 4$$

$$= x^4 - 6x^3 + 13x^2 - 12x + 4.$$

$$\begin{aligned}
A^3 &= A \cdot A^2 = (x^2 - 3x + 2)(x^4 - 6x^3 + 13x^2 - 12x + 4) \\
&= x^2 \cdot x^4 + x^2 \cdot (-6x^3) + x^2 \cdot 13x^2 + x^2 \cdot (-12x) + x^2 \cdot 4 \\
&\quad + (-3x) \cdot x^4 + (-3x) \cdot (-6x^3) + (-3x) \cdot (13x^2) + (-3x) \cdot (-12x) + (-3x) \cdot 4 \\
&\quad + 2x^4 + 2 \cdot (-6x^3) + 2 \cdot 13x^2 + 2 \cdot (-12x) + 2 \cdot 4 \\
&= x^6 - 6x^5 + 13x^4 - 12x^3 + 4x^2 \\
&\quad - 3x^5 + 18x^4 - 39x^3 + 36x^2 - 12x \\
&\quad + 2x^4 - 12x^3 + 26x^2 - 24x + 8 \\
&= x^6 + (-6 - 3)x^5 + (13 + 18 + 2)x^4 + (-12 - 39 - 12)x^3 + (4 + 36 + 26)x^2 + (-12 - 24)x + 8 \\
&= x^6 - 9x^5 + 33x^4 - 63x^3 + 66x^2 - 36x + 8.
\end{aligned}$$

29) Pour  $x = -4$ ,  $A = (-4)^2 - 3 \cdot (-4) + 2 = 16 + 12 + 2 = 30$   
 donc  $A^2 = 30^2 = 900$  et  $A^3 = 30^3 = 27000$ .

D'autre part,  $x^4 - 6x^3 + 13x^2 - 12x + 4 = (-4)^4 - 6(-4)^3 + 13 \cdot (-4)^2 - 12 \cdot (-4) + 4$

$$\begin{aligned}
&= 256 - 6(-64) + 13 \cdot 16 + 48 + 4 \\
&= 256 + 384 + 208 + 48 + 4 \\
&= 900.
\end{aligned}$$

$$\begin{aligned}
&x^6 - 9x^5 + 33x^4 - 63x^3 + 66x^2 - 36x + 8 \\
&= (-4)^6 - 9 \cdot (-4)^5 + 33 \cdot (-4)^4 - 63 \cdot (-4)^3 + 66 \cdot (-4)^2 - 36 \cdot (-4) + 8 \\
&= 4096 - 9 \cdot 1024 + 33 \cdot 256 - 63 \cdot (-64) + 66 \cdot 16 + 144 + 8 \\
&= 4096 + 9216 + 8448 + 4032 + 1056 + 144 + 8 \\
&= 27000.
\end{aligned}$$

475.  $(2x - 7)(-3x + 2) = (2x) \cdot (-3x) + 2x \cdot 2 + (-7) \cdot (-3x) + (-7) \cdot 2$

$$\begin{aligned}
&= -6x^2 + 4x + 21x - 14 \\
&= -6x^2 + 25x - 14.
\end{aligned}$$

476.  $(4x^5 + 7 - 2x^3)(x^3 - 2x) = 4x^5 \cdot x^3 + 4x^5 \cdot (-2x) + 7 \cdot x^3 + 7 \cdot (-2x) + (2x^3) \cdot x^3 + (-2x^3) \cdot (-2x)$

$$\begin{aligned}
&= 4x^8 - 8x^6 + 7x^3 - 14x - 2x^6 + 4x^4 \\
&= 4x^8 - 8x^6 - 2x^6 + 4x^4 + 7x^3 - 14x \\
&= 4x^8 - 10x^6 + 4x^4 + 7x^3 - 14x.
\end{aligned}$$

$$477. (5x^2 - 2x)(3x - 4x^2) = \underbrace{5x^2 \cdot 3x + 5x^2 \cdot (-4x^2)}_{= 15x^4 - 20x^5} + \underbrace{(-2x) \cdot 3x + (-2x) \cdot (-4x^2)}_{= -6x^3 + 8x^3} = -20x^5 + 15x^4 + 8x^3 - 6x^2$$

$$478. (2x - 7x^2 + 5x^3)(3x - 5x^2 + 8) = 2x \cdot 3x + 2x \cdot (-5x^2) + 2x \cdot 8 + (-7x^2) \cdot 3x + (-7x^2) \cdot (-5x^2) + (-7x^2) \cdot 8 + 5x^3 \cdot 3x + 5x^3 \cdot (-5x^2) + 5x^3 \cdot 8 = 6x^2 - 10x^3 + 16x - 21x^2 + 35x^4 - 56x^2 + 15x^4 - 25x^6 + 40x^3 = -25x^6 + (15+35)x^4 + (40-10-21)x^3 + (6-56)x^2 + 16x = -25x^6 + 50x^4 + 9x^3 - 50x^2 + 16x$$

$$479. \left(-2x + \frac{3}{2}\right)(4x+3) = (-2x) \cdot (4x) + (-2x) \cdot 3 + \frac{3}{2} \cdot 4x + \frac{3}{2} \cdot 3 = -8x^2 - 6x + 6x + \frac{9}{2} = -8x^2 + \frac{9}{2}$$

$$480. \left(\frac{8}{3}x - \frac{3}{2}x^2 + 5\right)(4x^3 - 5x^2 + 7) = \frac{8}{3}x \cdot 4x^3 + \frac{8}{3}x \cdot (-5x^2) + \frac{8}{3}x \cdot 7 + \left(\frac{-3}{2}x^2\right) \cdot 4x^3 + \left(\frac{-3}{2}x^2\right) \cdot (-5x^2) + \left(\frac{-3}{2}x^2\right) \cdot 7 + 5 \cdot 4x^3 + 5 \cdot (-5x^2) + 5 \cdot 7 = \frac{32}{3}x^4 - \frac{40}{3}x^3 + \frac{56}{3}x - 6x^5$$

$$481. (7x^4 - 2x^3 + 4x^2)(3x^2 - 5) = 7x^4 \cdot 3x^2 + 7x^4 \cdot (-5) + (-2x^3) \cdot 3x^2 + (-2x^3) \cdot (-5) + (4x^2) \cdot 3x^2 + (4x^2) \cdot (-5) = 21x^6 - 35x^4 - 6x^5 + 10x^3 + 12x^4 - 20x^2 = 21x^6 - 6x^5 + 12x^4 - 35x^4 + 10x^3 - 20x^2 = 21x^6 - 6x^5 - 23x^4 + 10x^3 - 20x^2$$

$$482. (2x^2 - 4x^3)(x^2 - 2x) = 2x^2 \cdot x^2 + 2x^2 \cdot (-2x) + (-4x^3) \cdot x^2 + (-4x^3) \cdot (-2x) = 2x^4 - 4x^3 - 4x^5 + 8x^4 = -4x^5 + 2x^4 + 8x^4 - 4x^3 = -4x^5 + 10x^4 - 4x^3$$

$$\begin{aligned}
 483. (2x^2 - 4 + 2x)(x^2 + 5 - 2x) &= 2x^2 \cdot x^2 + 2x^2 \cdot 5 + 2x^2 \cdot (-2x) \\
 &\quad + (-4)x^2 + (-4)5 + (-4)(-2x) \\
 &\quad + 2x \cdot x^2 + 2x \cdot 5 + 2x \cdot (-2x) \\
 &= 2x^4 + 10x^2 - 4x^3 - 4x^2 - 20 + 8x + 2x^3 + 10x - 4x^2 \\
 &= 2x^4 - 4x^3 + 2x^3 + 10x^2 - 4x^2 - 4x^2 + 8x + 10x - 20 \\
 &= 2x^4 - 2x^3 + 2x^2 + 18x - 20
 \end{aligned}$$

$$\begin{aligned}
 484. \left(\frac{5}{4}x^3 - 2x + 1\right) \left(\frac{7}{2}x^3 - \frac{2}{3}x + x^2\right) &= \frac{5}{4}x^3 \cdot \frac{7}{2}x^3 + \frac{5}{4}x^3 \cdot \left(-\frac{2}{3}x\right) + \frac{5}{4}x^3 \cdot x^2 \\
 &\quad + (-2x) \cdot \frac{7}{2}x^3 + (-2x) \cdot \left(-\frac{2}{3}x\right) + (-2x) \cdot x^2 \\
 &\quad + \frac{1}{2} \cdot \frac{7}{2}x^3 + \frac{1}{2} \cdot \left(-\frac{2}{3}x\right) + \frac{1}{2}x^2 \\
 &= \frac{35}{8}x^6 - \frac{5}{6}x^4 + \frac{5}{4}x^5 - 7x^4 + \frac{1}{3}x^2 - 2x^3 + \frac{7}{4}x^3 - \frac{1}{3}x + \frac{1}{2}x^2 \\
 &= \frac{35}{8}x^6 + \frac{5}{4}x^5 + \left(\frac{5}{6} - 7\right)x^4 + \left(-2 + \frac{7}{4}\right)x^3 + \left(\frac{1}{3} + \frac{1}{2}\right)x^2 - \frac{1}{3}x \\
 &= \frac{35}{8}x^6 + \frac{5}{4}x^5 + \frac{37}{6}x^4 - \frac{1}{4}x^3 + \frac{11}{6}x^2 - \frac{1}{3}x.
 \end{aligned}$$

$$\begin{aligned}
 485. (2x+3)(3x+2)(x-4) &= (2x \cdot 3x + 2x \cdot 2 + 3 \cdot 3x + 3 \cdot 2)(x-4) \\
 &= (6x^2 + 4x + 9x + 6)(x-4) \\
 &= (6x^2 + 13x + 6)(x-4) \\
 &= 6x^2 \cdot x + 6x^2 \cdot (-4) + 13x \cdot x + 13x \cdot (-4) + 6x + 6 \cdot (-4) \\
 &= 6x^3 - 24x^2 + 13x^2 - 52x + 6x - 24 \\
 &= 6x^3 - 11x^2 - 46x - 24.
 \end{aligned}$$

$$\begin{aligned}
 486. (5x-1)(2x+3)(7+4x) &= (5x \cdot 2x + 5x \cdot 3 + (-1) \cdot 2x + (-1) \cdot 3)(7+4x) \\
 &= (10x^2 + 15x - 2x - 3)(7+4x) \\
 &= (10x^2 + 13x - 3)(7+4x) \\
 &= 10x^3 \cdot 7 + 10x^3 \cdot 4x + 13x \cdot 7 + 13x \cdot 4x + (-3) \cdot 7 + (-3) \cdot 4x \\
 &= 70x^3 + 40x^3 + 91x + 52x^2 - 21 - 12x \\
 &= 40x^3 + (70+52)x^2 + (91-12)x - 21 \\
 &= 40x^3 + 122x^2 + 79x - 21.
 \end{aligned}$$

$$\begin{aligned}
 487. (3x^2 - 1)(x+1)(x-1) &= (3x^2 - 1)(x^2 - 1) = 3x^2 \cdot x^2 + 3x^2 \cdot (-1) + (-1)x^2 + (-1) \cdot (-1) \\
 &= 3x^4 - 3x^2 - x^2 + 1 \\
 &= 3x^4 - 4x^2 + 1.
 \end{aligned}$$

$$\begin{aligned}
 488. \left(x - \frac{3}{5}\right)(5x^2 - 1)(5x + 3) &= \left(x \cdot 5x^2 + x \cdot (-1) + \frac{3}{5} \cdot 5x^2 + \frac{3}{5} \cdot (-1)\right)(5x + 3) \\
 &= (5x^3 - x - 3x^2 + \frac{3}{5})(5x + 3) \\
 &= 5x^3 \cdot 5x + 5x^3 \cdot 3 + (-x) \cdot 5x + (-x) \cdot 3 + (-3x^2) \cdot 5x + (-3x^2) \cdot 3 + \frac{3}{5} \cdot 5x + \frac{3}{5} \cdot 3 \\
 &= 25x^4 + 15x^3 - 5x^2 - 3x - 15x^3 - 9x^2 + 3x + \frac{9}{5} \\
 &= 25x^4 + 15x^3 - 15x^3 - 5x^2 - 9x^2 - 3x + 3x + \frac{9}{5} \\
 &= 25x^4 - 14x^2 + \frac{9}{5}.
 \end{aligned}$$

$$\begin{aligned}
 489. (2x^2 + 3x - 4)^2 &= (2x^2 + 3x - 4)(2x^2 + 3x - 4) \\
 &= 2x^2 \cdot 2x^2 + 2x^2 \cdot 3x + 2x^2 \cdot (-4) \\
 &\quad + 3x \cdot 2x^2 + 3x \cdot 3x + 3x \cdot (-4) \\
 &\quad + (-4) \cdot 2x^2 + (-4) \cdot 3x + (-4) \cdot (-4) \\
 &= 4x^4 + 6x^3 - 8x^2 + 6x^3 + 9x^2 - 12x - 8x^2 - 12x + 16 \\
 &= 4x^4 + 12x^3 - 7x^2 - 24x + 16.
 \end{aligned}$$

$$\begin{aligned}
 490. (4x^3 - 7x + 2x^2 + 5)^2 &= (4x^3 + 2x^2 - 7x + 5)(4x^3 + 2x^2 - 7x + 5) \\
 &= 4x^3 \cdot 4x^3 + 4x^3 \cdot 2x^2 + 4x^3 \cdot (-7x) + 4x^3 \cdot 5 \\
 &\quad + 2x^2 \cdot 4x^3 + 2x^2 \cdot 2x^2 + 2x^2 \cdot (-7x) + 2x^2 \cdot 5 \\
 &\quad + (-7x) \cdot 4x^3 + (-7x) \cdot 2x^2 + (-7x) \cdot (-7x) + (-7x) \cdot 5 \\
 &\quad + 5 \cdot 4x^3 + 5 \cdot 2x^2 + 5 \cdot (-7x) + 5 \cdot 5 \\
 &= 16x^6 + 8x^5 - 28x^4 + 20x^3 + 8x^5 + 4x^4 - 14x^3 + 10x^2 \\
 &\quad - 28x^4 - 14x^3 + 49x^2 - 35x + 20x^3 + 10x^2 - 35x + 25 \\
 &= 16x^6 + 16x^5 - 52x^4 + 12x^3 + 68x^2 - 70x + 25
 \end{aligned}$$

$$\begin{aligned}
 451. (7x-5)^3 &= (7x-5)(7x-5)(7x-5) \\
 &= (7x \cdot 7x + 7x \cdot (-5) + (-5) \cdot 7x + (-5) \cdot (-5))(7x-5) \\
 &= (49x^2 - 70x + 25)(7x-5) \\
 &= 49x^2 \cdot 7x + 49x^2 \cdot (-5) + (-70x) \cdot 7x + (-70x) \cdot (-5) + 25 \cdot 7x + 25 \cdot (-5) \\
 &= 343x^3 - 245x^2 - 430x^2 + 350x + 175x - 125 \\
 &= 343x^3 - 735x^2 + 425x - 125.
 \end{aligned}$$

$$\begin{aligned}
 452. (x^2-x+2)^3 &= (x^2-x+2)(x^2-x+2)(x^2-x+2) \\
 &= (x^2 \cdot x^2 + x^2 \cdot (-x) + x^2 \cdot 2 + (-x) \cdot x^2 + (-x) \cdot (-x) + (-x) \cdot 2 + 2x^2 \cdot 2 \cdot (-x) + 2 \cdot 2)(x^2-x+2) \\
 &= (x^4 - x^3 + 2x^2 - x^3 + x^2 - 2x + 2x^2 - 2x + 4)(x^2-x+2) \\
 &= (x^4 - 2x^3 + 5x^2 - 4x + 4)(x^2-x+2) \\
 &= x^4 \cdot x^2 + x^4 \cdot (-x) + x^4 \cdot 2 + (-2x^3) \cdot x^2 + (-2x^3) \cdot (-x) + (-2x^3) \cdot 2 \\
 &\quad + 5x^2 \cdot x^2 + 5x^2 \cdot (-x) + 5x^2 \cdot 2 + (-4x) \cdot x^2 + (-4x) \cdot (-x) + (-4x) \cdot 2 \\
 &\quad + 4x^2 + 4 \cdot (-x) + 4 \cdot 2 \\
 &= x^6 - x^5 + 2x^4 - 2x^5 + 2x^4 - 4x^3 + 5x^4 - 5x^3 + 10x^2 - 4x^3 + 4x^2 - 8x + 4x^2 - 4x + 8 \\
 &= x^6 - 3x^5 + 9x^4 - 13x^3 + 18x^2 - 12x + 8
 \end{aligned}$$

$$\begin{aligned}
 491. (7x-5)^3 &= (7x-5)(7x-5)(7x-5) \\
 &= (7x \cdot 7x + 7x \cdot (-5) + (-5)7x + (-5) \cdot (-5))(7x-5) \\
 &= (49x^2 - 70x + 25)(7x-5) \\
 &= 49x^2 \cdot 7x + 49x^2 \cdot (-5) + (-70x) \cdot 7x + (-70x) \cdot (-5) + 25 \cdot 7x + 25 \cdot (-5) \\
 &= 343x^3 - 245x^2 - 130x^2 + 350x + 175x - 125 \\
 &= 343x^3 - 735x^2 + 425x - 125.
 \end{aligned}$$

$$\begin{aligned}
 492. (x^2-x+2)^3 &= (x^2-x+2)(x^2-x+2)(x^2-x+2) \\
 &= (x^2 \cdot x^2 + x^2 \cdot (-x) + x^2 \cdot 2 + (-x) \cdot x^2 + (-x) \cdot (-x) + (-x) \cdot 2 + 2 \cdot x^2 + 2 \cdot (-x) + 2 \cdot 2)(x^2-x+2) \\
 &= (x^4 - x^3 + 2x^2 - x^3 + x^2 - 2x + 2x^2 - 2x + 4)(x^2-x+2) \\
 &= (x^4 - 2x^3 + 5x^2 - 4x + 4)(x^2-x+2) \\
 &= x^4 \cdot x^2 + x^4 \cdot (-x) + x^4 \cdot 2 + (-2x^3) \cdot x^2 + (-2x^3) \cdot (-x) + (-2x^3) \cdot 2 \\
 &\quad + 5x^2 \cdot x^2 + 5x^2 \cdot (-x) + 5x^2 \cdot 2 + (-4x) \cdot x^2 + (-4x) \cdot (-x) + (-4x) \cdot 2 \\
 &\quad + 4x^3 \cdot 4x(-x) + 4 \cdot 2 \\
 &= x^6 - x^5 + 2x^4 - 2x^5 + 2x^4 - 4x^3 + 5x^4 - 5x^3 + 10x^2 - 4x^3 + 4x^2 - 8x + 4x^2 - 4x + 8 \\
 &= x^6 - 3x^5 + 9x^4 - 13x^3 + 18x^2 - 12x + 8
 \end{aligned}$$

$$\begin{aligned}
 493. 5x(3a^2+b^3) - [5(2a^2-b^3) - 2(a^2-5b^3)] &= 5 \cdot 3a^2 - 5 \cdot 4b^3 - [5 \cdot 2a^2 - 5b^3 - (2a^2 - 2 \cdot 5b^3)] \\
 &= 15a^2 - 20b^3 - [18a^2 - 5b^3 - 2a^2 + 10b^3] \\
 &= 15a^2 - 20b^3 - [16a^2 + b^3] \\
 &= 15a^2 - 20b^3 - 16a^2 - b^3 \\
 &= -a^2 - 21b^3
 \end{aligned}$$

$$\begin{aligned}
 494. 3a^2(2b-1) - [2a^2(5b-3) - 2b(3a^2+1)] &= 3a^2 \cdot 2b - 3a^2 - [2a^2 \cdot 5b - 2a^2 \cdot 3 - (2b \cdot 3a^2 + 2b \cdot 1)] \\
 &= 6a^2b - 3a^2 - [10a^2b - 6a^2 - (6a^2b + 2b)] \\
 &= 6a^2b - 3a^2 - [10a^2b - 6a^2 - 6a^2b - 2b] \\
 &= 6a^2b - 3a^2 - [4a^2b - 6a^2 - 2b] \\
 &= 6a^2b - 3a^2 - 4a^2b + 6a^2 + 2b \\
 &= 2a^2b + 3a^2 + 2b
 \end{aligned}$$

$$\begin{aligned}
 495. & (2a+5b)(3a-2b) - [2a-1](3a+2b) - [a-2b](5b-1) \\
 & = [2a \cdot 3a + 2a \cdot (-2b) + 5b \cdot 3a + 5b \cdot (-2b)] \\
 & \quad - [2a \cdot 3a + 2a \cdot 2b + (-1) \cdot 3a + (-1) \cdot 2b] \\
 & \quad - [a \cdot 5b + a \cdot (-1) \cdot (-2b) \cdot 5b + (-2b) \cdot (-1)] \\
 & = [6a^2 - 4ab + 15ab - 10b^2] - [6a^2 + 4ab - 3a \cdot 2b] - [5ab - a - 10b^2 + 2b] \\
 & = 6a^2 + 11ab - 10b^2 - 6a^2 - 4ab + 3a \cdot 2b - 5ab + a + 10b^2 - 2b \\
 & = \underbrace{6a^2 - 6a^2}_{0} + \underbrace{11ab - 4ab - 5ab}_{2ab} - \underbrace{10b^2 + 10b^2}_{0} + \underbrace{3a + a + 2b - 2b}_{4a} \\
 & = 0 + 2ab + 0 + 4a + 0 \\
 & = 2ab + 4a.
 \end{aligned}$$

$$\begin{aligned}
 496. & (2x-3y)(5x-2y) - [3x-2y](2x+1) - [5x-y](3y+1) \\
 & = [2x \cdot 5x + 2x \cdot (-2y) + (-3y) \cdot 5x + (-3y) \cdot (-2y)] \\
 & \quad - [3x \cdot 2x + 3x \cdot 1 + (-2y) \cdot 2x + (-2y) \cdot 1] \\
 & \quad - [5x \cdot 3y + 5x \cdot (-y) + 3y \cdot 3y + (-y) \cdot 1] \\
 & = [10x^2 - 4xy - 15xy + 6y^2] - [6x^2 + 3x - 4xy - 2y] - [15xy + 5x - 3y^2 - y] \\
 & = 10x^2 - 19xy + 6y^2 - 6x^2 - 3x + 4xy + 2y - 15xy - 5x + 3y^2 + y \\
 & = 10x^2 - 6x^2 - 19xy + 4xy - 15xy + 6y^2 + 3y^2 - 3x - 5x + 2y + y \\
 & = 4x^2 - 30xy + 9y^2 - 8x + 3y.
 \end{aligned}$$

$$\begin{aligned}
 497. & (ax^2-b)(ax^2-2b) + 3b(ax^2-b) + b(b-1) \\
 & = [ax^2 \cdot ax^2 + ax^2 \cdot (-2b) - ba \cdot x^2 + (-b) \cdot (-2b)] + [3ba \cdot x^2 + 3b \cdot (-b)] + bb + b(-1) \\
 & = [a^2x^4 - 2abx^2 - abx^2 + 2b^2] + [3abx^2 - 3b^2] + b^2 - b \\
 & = a^2x^4 - 3abx^2 + 3abx^2 + 2b^2 - 3b^2 + b^2 - b \\
 & = a^2x^4 - b
 \end{aligned}$$

$$\begin{aligned}
 498. & (x-1)(x-2)(x-3) = (x-1)(x^2 - 2x - 3x + 6) \\
 & = (x-1)(x^2 - 5x + 6) \\
 & = x \cdot x^2 - x \cdot 5x + x \cdot 6 - x^2 + 5x - 6 \\
 & = x^3 - 5x^2 + 6x - x^2 + 5x - 6 \\
 & = x^3 - 6x^2 + 11x - 6
 \end{aligned}$$

$$6(x-1)(x-2) = 6(x^2 - 2x - x + 2) = 6(x^2 - 3x + 2) = 6x^2 - 18x + 12.$$

$$7(x-1) = 7x - 7$$

Donc:  $(x-1)(6x-2)(x-3) + 6(x-1)(x-2) + 7(x-1)$   
 $= x^3 - 6x^2 + 11x - 6 + 6x^2 - 18x + 12 + 7x - 7$   
 $= x^3 - 6x^2 + 6x^2 + 11x - 18x + 7x - 6 + 12 - 7$   
 $= x^3 - 1.$

Autre méthode: ⑩  $(x-1)(x-2)(x-3) + 6(x-1)(x-2) + 7(x-1)$   
 $= (x-1)[(x-2)(x-3) + 6(x-2) + 7]$   
 $= (x-1)[(x-2)(x-3+6) + 7]$   
 $= (x-1)[(x-2)(x+3) + 7]$   
 $= (x-1)[x^2 - 2x + 3x - 6 + 7]$   
 $= (x-1)(x^2 + x + 1)$   
 $= x \cdot x^2 + x \cdot x + x \cdot 1 - x^2 - x - 1$   
 $= x^3 + x^2 + x - x^2 - x - 1 = x^3 - 1.$

499.  $(x^2 + y^2)(x^2 - y^2)(x-y) + xy(x^3 + y^3)$   
 $= (x^2 \cdot x^2 - y^2 \cdot y^2)(x-y) + xy(x^3 + y^3)$   
 $= (x^4 - y^4)(x-y) + x^2y^2x^3 + x^2y^3$   
 $= x^4x - x^4y - y^4x + y^4y + x^4y + x^2y^4$   
 $= x^5 + y^5$

500.  $\frac{2}{3}x^3y\left(2x^2 - \frac{y}{3}\right) - 2x^2(2x^2 - 1) + \left(2x^2 - \frac{y}{3}\right)\left(1 - \frac{y}{3}\right)(2x^2 - 1)$   
 $= \frac{4}{3}x^4y - \frac{2}{3}x^2y^2 - 4x^4 + 2x^2 + \left(2x^2 - \frac{2}{3}x^3y - \frac{y}{3} + \frac{y^2}{3}\right)(2x^2 - 1)$   
 $= \frac{4}{3}x^4y - \frac{2}{3}x^2y^2 - 4x^4 + 2x^2 + \left[4x^4 - 2x^2 - \frac{4}{3}x^4y + \cancel{\frac{2}{3}x^2y} - \cancel{\frac{2}{3}x^2y} + \frac{y^2}{3} + \frac{2}{3}x^2y^2 - \frac{y^2}{3}\right]$   
 $= \left(\frac{4}{3} - \frac{4}{3}\right)x^4y + \left(-\frac{2}{3} + \frac{2}{3}\right)x^2y^2 + (-4 + 4)x^4 + (2 - 2)x^2 + \frac{y^2}{3} - \frac{y^2}{3} = \frac{y^2}{3} - \frac{y^2}{3}.$