Semaine 5 : Exercices mélangés :

1. $49x^3 - x$ $= x(49x^2 - 1) = x(7x-1)(7x+1)$

2. $\frac{x^2}{4} + \frac{1}{49} - \frac{x}{7}$ $= \left(\frac{x}{2} - \frac{1}{7}\right)^2$

3. $9x^2y^2 - 16$ $= (3xy - 4)(3xy + 4)$

4. $4a^2b^3 - b$ $= b(4a^2b^2 - 1) = b(2ab-1)(2ab+1)$

5. $75a^2 + 30a + 3$ $= 3(25a^2 + 10a + 1) = 3(5a+1)^2$

6. $(x+3)^2 - 16$ $= [(x+3) - 4][(x+3) + 4]$

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

7. $4x^2(x+3) - (3+x)$ $= (3+x)(4x^2 - 1) = (3+x)(2x-1)(2x+1)$

8. $9(x^2-4) - y4(x^2-4)$ $= (x^2-4)(9-y^4)$

$= (x-2)(x+2)(3-y)(3+y)$

9. $3x(y^2 - 2y) + 3x$ $= 3x(y^2 - 2y + 1)$

$= 3x(y-1)^2$

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

11. $(4x^2 + 12x)^2 + 9(4x^2 + 12x)$ $= (4x^2+12x)(4x^2+12x+9)$

$= 4x(x+3)(2x+3)^2$

12. $3x^4\left(x^2 - \frac{4}{9}\right) - 75\left(x^2 - \frac{4}{9}\right)$ $= 3\left(x^2 - \frac{4}{9}\right)(x^4 - 25)$

$= 3\left(x - \frac{2}{3}\right)\left(x + \frac{2}{3}\right)(x^2-5)(x^2+5)$

13. $2a(x + y) - 3b(-x - y)$ $= 2a(x+y) + 3b(x+y)$

$= (x+y)(2a+3b)$

14. $x(2a - b) + y(b - 2a)$ $= x(2a-b) - y(2a-b)$

$= (2a-b)(x-y)$

15. $a(x - y) - (y - x)$ $= a(x-y) + 1(x-y)$

$= (x-y)(a+1)$

16. $(4a - 2b)(2x - 3y) + (3y - 2x)(b - 2a)$ $= 2(2a-b)(2x-3y) + (2x-3y)(2a-b)$

$= 3(2x-3y)(2a-b)$

17. $a^2(x - 1)(a + b) + a^3(1 - x)$ $= a^2(x-1)(a+b) - a^3(x-1)$

$= a^2(x-1)[(a+b) - a]$

$= a^2b(x-1)$

18. $(x - 2y)(a - b) - (b - a)(2x + y)$ $= (x-2y)(a-b) + (a-b)(2x+y)$

$= (a-b)[(x-2y) + (2x+y)]$

$= (a-b)(3x-y)$

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19. $5x^2 - 5$ $= 5(x^2-1) = 5(x-1)(x+1)$

20. $a^4x^4 - a^4$ $= a^4(x^4-1) = a^4(x^2-1)(x^2+1)$

$= a^4(x-1)(x+1)(x^2+1)$

21. $a^4b^2x^5 - a^2x$ $= a^2x(a^2b^2x^4-1)$

$= a^2x(abx^2-1)(abx^2+1)$

22. $9x^5y^7 - xy$ $= xy(9x^4y^6-1) = xy(3x^2y^3-1)(3x^2y^3+1)$

23. $12(x+2)^3 - 3(x+2)$ $= 3(x+2)[4(x+2)^2-1]$

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

24. $(a-b) - (a-b)x^4$ $= (a-b)(1-x^4) = (a-b)(1-x^2)(1+x^2)$

$= (a-b)(1-x)(x+1)(x^2+1)$

25. $-3x^9 + 3x^5$ $= -3x^5(x^4-1)$

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

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

$(*) = 3(x+2)(2x+3)(2x+5)$

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26. $24x - 4 + 5x^4 - 6x^3 - 19x^2 = 5x^4 - 6x^3 - 19x^2 + 24x - 4$

div $4 = \{\pm 1, \pm 2, \pm 4\}$

$P(1) = 0, \quad P(2) = 0, \quad P(-2) = 0$

	5	-6	-19	24	-4
1		5	-1	-20	4
	5	-1	-20	4	0
2		10	18	-4	
	5	9	-2	0	
-2		-10	2		
	5	-1	0		

$5x^4 - 6x^3 - 19x^2 + 24x - 4 = (x-1)(x-2)(x+2)(5x-1)$

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