

CURSO MENTOR

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Tema: Produtos Notáveis II

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Q1. Demonstre as identidades a seguir:

1. $(a + b)^2 \equiv a^2 + 2ab + b^2$

2. $(a - b)^2 \equiv a^2 - 2ab + b^2$

3. $(a + b)^3 \equiv a^3 + 3a^2b + 3ab^2 + b^3$

4. $(a - b)^3 \equiv a^3 - 3a^2b + 3ab^2 - b^3$

5. $(a + b)^2 - (a - b)^2 \equiv 4ab$

6. $a^3 + b^3 \equiv (a + b)^3 - 3ab(a + b)$

7. $a^3 - b^3 \equiv (a - b)(a^2 + ab + b^2)$

8. $a^3 + b^3 \equiv (a + b)(a^2 - ab + b^2)$

9. $ab \equiv \left(\frac{a+b}{2}\right)^2 - \left(\frac{a-b}{2}\right)^2$

10. $(a + b)^2 + (a - b)^2 \equiv 2(a^2 + b^2)$

11. $(a - b)(a + b)(a^2 + b^2) \equiv a^4 - b^4$

12. $(a - b)(a + b)(a^2 + b^2)(a^4 + b^4) \equiv a^8 - b^8$

13. $(a + b)^3 \equiv a(a - 3b)^2 + b(b - 3a)^2$

14. $ab(a - b) + bc(b - c) + ca(c - a) \equiv (a - b)(b - c)(a - c)$

15. $(a + b + c)(ab + bc + ca) - abc \equiv (a + b)(b + c)(a + c)$

16. $(a - b)^3 + (b - c)^3 + (c - a)^3 \equiv 3(a - b)(b - c)(c - a)$

17. $(a + b - c)^3 + (b + c - a)^3 + (c + a - b)^3 + 24abc \equiv (a + b + c)^3$

18. $a^3 + b^3 + c^3 - 3abc \equiv (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

19. $a^3 + b^3 + c^3 - 3abc \equiv (a + b + c) \left[\frac{(a - b)^2}{2} + \frac{(b - c)^2}{2} + \frac{(a - c)^2}{2} \right]$
20. $a^3(b - c) + b^3(c - a) + c^3(a - b) + (a + b + c)(a - b)(b - c)(c - a) \equiv 0$
21. $a^3(b - c)^3 + b^3(c - a)^3 + c^3(a - b)^3 \equiv 3abc(a - b)(b - c)(c - a)$
22. $(a^2 + ab + b^2)(a^2 - ab + b^2) \equiv a^4 + a^2b^2 + b^4$
23. $(a + b + c)^2 \equiv a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$
24. $(a + b + c)^3 \equiv a^3 + b^3 + c^3 + 3a^2b + 3a^2c + 3b^2a + 3b^2c + 3c^2a + 3c^2b + 6abc$
25. $(a + b)^2 + (b + c)^2 + (c + a)^2 \equiv (a + b + c)^2 + a^2 + b^2 + c^2$
26. $(a - b)^2(a + b)^2(a^2 + b^2)^2 \equiv (a^4 - b^4)^2$
27. $(a + b + c)^2 + (a - b)^2 + (b - c)^2 + (c - a)^2 \equiv 3(a^2 + b^2 + c^2)$
28. $(a + b + c + d)^2 + (a + b - c - d)^2 + (a - b + c - d)^2 + (a - b - c + d)^2 \equiv 4(a^2 + b^2 + c^2 + d^2)$
29. $\frac{(x - b)(x - c)}{(a - b)(a - c)} + \frac{(x - c)(x - a)}{(b - c)(b - a)} + \frac{(x - a)(x - b)}{(c - a)(c - b)} \equiv 1$
30. $(y + z)^2 + (z + x)^2 + (x + y)^2 - x^2 - y^2 - z^2 \equiv (x + y + z)^2$
31. $(x^2 + xy + z^2)^2 - 4xy(x^2 + y^2) \equiv (x^2 - xy + y^2)^2$
32. $\frac{a^2(x - b)(x - c)}{(a - b)(a - c)} + \frac{b^2(x - c)(x - a)}{(b - c)(b - a)} + \frac{c^2(x - a)(x - b)}{(c - a)(c - b)} \equiv x^2 \quad a \neq b \neq c$
33. $\frac{a(x - b)(x - c)}{(a - b)(a - c)} + \frac{b(x - c)(x - a)}{(b - c)(b - a)} + \frac{c(x - a)(x - b)}{(c - a)(c - b)} \equiv x \quad a \neq b \neq c$