

Ecuaciones Exponenciales:

Halla las soluciones de:

$$3^{x^2+5x-4} \cdot 9^{2x+3} = 27^{x-1}$$

Solución:

$$3^{x^2+5x-4} \cdot 3^{2(2x+3)} = 3^{3(x-1)}$$

$$3^{x^2+5x-4+2(2x+3)} = 3^{3(x-1)}$$

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

$$x^2 + 6x + 5 = 0 \implies x = \frac{-6 \pm \sqrt{36 - 20}}{4}$$

$$x = \frac{-6 \pm 4}{2} \implies x = -1, x = -5$$

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Calcular

$$2 \cdot 3^{2x-1} + 3^{x+1} - 1 = 0$$

Solución:

$$2 \cdot 3^{2x-1} + 3^{x+1} - 1 = 0 \implies \frac{2 \cdot 3^{2x}}{3} + 3 \cdot 3^x - 1 = 0 \implies 2 \cdot 3^{2x} + 9 \cdot 3^x - 3 = 0$$

Haciendo el cambio de variables $u = 3^x$ la ecuación quedará de la siguiente forma:

$$2u^2 + 9u - 3 = 0 \implies u = 0,3117376914, u = -4,811737691$$

Deshaciendo el cambio de variable tenemos que

$$u = 0,3117376914 = 3^x \implies \log 0,3117376914 = \log 3^x \implies$$

$$x \log 3 = \log 0,3117376914 \implies$$

$$x = \frac{\log 0,3117376914}{\log 3} = -1,060968632$$

En el otro caso, $u = -4,811737691 = 3^x$ no es posible obtener solución.

Calcular

$$7^{2x-1} + 7^{x+1} - 1 = 0$$

Solución:

$$\frac{(7^x)^2}{7} + 7 \cdot 7^x - 1 = 0 \implies \frac{t^2}{7} + 7t - 1 = 0 \implies \begin{cases} t = 0,14244 \\ t = -49,14224 \end{cases}$$

$$\begin{cases} t = 0,14244 = 7^x \implies x = -1,0015 \\ t = -49,14224 = 7^x \implies \text{No Vale} \end{cases}$$

Calcular

$$6^{2x-1} + 6^{x+1} - 1 = 0$$

Solución:

$$\frac{(6^x)^2}{6} + 6 \cdot 6^x - 1 = 0 \implies \frac{t^2}{6} + 6t - 1 = 0 \implies \begin{cases} t = 0,027764 \\ t = -36,02776 \end{cases}$$

$$\begin{cases} t = 0,027764 = 6^x \implies x = -2,0004 \\ t = -36,02776 = 6^x \implies \text{No Vale} \end{cases}$$

Calcular $3^{2x+1} - 3^{x-1} - 1 = 0$

Solución:

$$3(3^x)^2 - \frac{3^x}{3} - 1 = 0 \implies 3t^2 - \frac{t}{3} - 1 = 0 \implies \begin{cases} t = 0,63557 \\ t = -0,524461 \end{cases}$$

$$\begin{cases} t = 0,63557 = 3^x \implies x = -0,41255 \\ t = -0,524461 = 3^x \implies \text{No Vale} \end{cases}$$

Calcular $2^x - 2^{x+1} + 1 = 0$

Solución:

$$2^x - 2 \cdot 2^x + 1 = 0 \implies t - 2t + 1 = 0 \implies t = 1$$

$$t = 2^x = 1 \implies x = 0$$

Calcular $5^{2x-1} - 5^x + 1 = 0$

Solución:

$$\frac{(5^x)^2}{5} - 5^x + 1 = 0 \implies \frac{t^2}{5} - t + 1 = 0 \implies t^2 - 5t + 5 = 0$$

$$\begin{cases} t = 5^x = 3,618 \implies x = 0,714 \\ t = 5^x = 1,381 \implies x = 0,296 \end{cases}$$

Calcular $2^x - 2^{x-1} - 1 = 0$

Solución:

$$2^x - \frac{2^x}{2} - 1 = 0 \implies t - \frac{t}{2} - 1 = 0 \implies t = 2 \implies 2^x = 2 \implies x = 1$$

Calcular

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|--|--|
| 1. $2^{x+1} = 8$ | Sol: $x = 2$ |
| 2. $2^{x+3} + 4^{x+1} = 320$ | Sol: $x = 3$ |
| 3. $6^{12-3x} = 216$ | Sol: $x = 3$ |
| 4. $5^{3x-12} = 125$ | Sol: $x = 5$ |
| 5. $2^x + 2^{x+3} = 36$ | Sol: $x = 2$ |
| 6. $3^x + 3^{x-2} = 270$ | Sol: $x = 5$ |
| 7. $5^x + 5^{x+1} + 5^{x+2} = \frac{31}{25}$ | Sol: $x = -2$ |
| 8. $5^{2x^2+3x-11} = 125$ | Sol: $x = 2$; $x = -\frac{7}{2}$ |
| 9. $4^x + 2^{2x-1} = 24$ | Sol: $x = 2$; la otra solución no es real. |
| 10. $2^x + 2^{2x} = 6$ | Sol: $x = 1$; la otra solución no es real. |
| 11. $3^{x+3} + 9^{x+2} = 4$ | Sol: $x = -2$; la otra solución no es real. |
| 12. $4^{2x+1} - 4^{x+2} = 768$ | Sol: $x = 2$; la otra solución no es real. |

13. $2^x \cdot 3^x = 12 \cdot 18$ Sol: $x = 3$
14. $9^{x+3} = 3^{2x+5}$ Sol: No tiene solución.
15. $8^{x^2+3x+2} = 1$ Sol: $x = -1$; $x = -2$
16. $5^x + 5^{x-1} + x^{x-2} = 31$ Sol: $x = 2$
17. $2^{x+2} = 0,5^{2x-1}$ Sol: $x = -\frac{1}{3}$
18. $\sqrt[3]{a^{7-x}} = a^2$ Sol: $x = 1$
19. $4^x - 5 \cdot 2^x + 4 = 0$ Sol: $x = 2$; $x = 0$
20. $7^{2x+3} - 8 \cdot 7^{x+1} + 1 = 0$ Sol: $x = -1$; $x = -2$
21. $4^x \cdot 5^{x-1} = 1600$ Sol: $x = 3$
22. $10^{x^2-11x+30} = (2 \cdot 5)^2$ Sol: $x = 7$; $x = 4$
23. $3^{x-1} + 3^x + 3^{x+1} = 117$ Sol: $x = 3$
24. $3^{2(x+1)} - 28 \cdot 3^x + 3 = 0$ Sol: $x = -2$; $x = 1$
25. $2^{2x} - 3 \cdot 2^{x+1} + 8 = 0$ Sol: $x = 2$; $x = 1$
26. $\left(\frac{2}{7}\right)^5 = 3,5^{x+1}$ Sol: $x = -6$
27. $5^x - \frac{5}{5^{x-1}} - 24 = 0$ Sol: $x = 2$
28. $(4^{3-x})^{2-x} = 1$ Sol: $x = 3$; $x = 2$
29. $2^{1-x^2} = \frac{1}{8}$ Sol: $x = \pm 2$
30. $3^{2x-1} = \sqrt[3]{9^{x^2-\frac{1}{4}}}$ Sol: $x = \frac{11}{2}$; $x = \frac{1}{2}$
31. $3 \cdot 2^{x+3} = 192 \cdot 3^{x-3}$ Sol: No tiene solución.

Calcular

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|--|---------------------------|---|----------------------------|
| 1. $2^{x-2} + 2^{x+1} - 1 = 0$ | Sol: $x = -1, 169925001$ | 10. $2^{2x-1} - 3 \cdot 2^{x+2} - 2 = 0$ | Sol: $x = 4, 594878436$ |
| 2. $3^{x+1} + 3^x - 3^{x-1} = 2$ | Sol: $x = -0, 5517286062$ | 11. $7^{2x-1} - 7^{x+1} - 2 = 0$ | Sol: $x = 2, 002970617$ |
| 3. $2^{x-2} - 2^x + 2^{x-1} = 0$ | Sol: No tiene solución. | 12. $6^{2x-1} - 6^{x-1} - 4 = 0$ | Sol: $x = 0, 9437163029$ |
| 4. $3^{x-2} + 2 \cdot 3^x = 1$ | Sol: $x = -0, 6801438331$ | 13. $5^{4x-1} - 5^{2x+1} - 3 = 0$ | Sol: $x = 0, 4606479652$ |
| 5. $4^{x-1} - 3 \cdot 4^x + 4^{x-2} = 0$ | Sol: No tiene solución. | 14. $4^{4x-1} - 4^{2x+1} - 7 = 0$ | Sol: $1, 034204992$ |
| 6. $2^{2x-1} + 2^{x+1} - 2 = 0$ | Sol: $x = -0, 2715533031$ | 15. $7^{4x+1} + 3 \cdot 7^{2x} - 5 = 0$ | Sol: $x = -0, 1076980693$ |
| 7. $5^{2x-1} + 3 \cdot 5^x - 2 = 0$ | Sol: $x = -0, 2778665354$ | 16. $3^{4x+1} + 2 \cdot 3^{2x-2} - 2 = 0$ | Sol: $x = -0, 1129051332$ |
| 8. $3^{2x-2} + 3^{x-1} - 1 = 0$ | Sol: $x = -1, 011034949$ | 17. $2^{4x+2} + 3 \cdot 2^{2x} - 1 = 0$ | Sol: $x = -1$ |
| 9. $2^{2x+1} - 3 \cdot 2^{x-1} - 3 = 0$ | Sol: $x = 0, 7275884076$ | 18. $5^{4x-2} + 5^{2x} - 1 = 0$ | Sol: $x = -0, 01174112826$ |