

1. Resuelve la ecuación:

1. $x(3x-2)-2x^2 = x(x-2)$
2. $x(2x-3)+4x-3 = 2x(x+1)$
3. $x(x-3)+x(3-x)+3x+1 = 0$
4. $2x^2-x(x+1)-4 = x(x-1)+x$
5. $x(3x-3)-x^2+6x = x(2x+2)$
6. $x(x-3)-x^2+4x+2 = 2(x+2)$
7. $x-x(3x-1) = 6x^2-3x(3x-1)$
8. $4x^2-3x(x+1)+x+3 = x(x-1)$
9. $3x(2x+1)+2x-1 = 3x(2x+3)$
10. $7x^2-3x(2x-2)-5x = x(x+2)$
11. $3(3x+2)+x^2-2x = x(x+3)+9$
12. $2x(3x+3)+3(x^2-x)-4 = 9x^2$
13. $3(2x^2-3)-2(x+1)-6x^2+7 = x$
14. $x-x(2x-2)-x(2x+1) = 1-4x^2$
15. $2-3(3x+1)-3x^2 = x-3x(x+3)$
16. $x^2+2x-8 = 3x(x-2)-2(x-2)^2$
17. $3(x+2)^2-3(x-1)-3x^2-9x = 11$
18. $8x^2-x(2x+1)-3x(2x-1) = x-1$
19. $8x-2x^2-x(x-3) = 11-3(x-2)^2$
20. $2x^2-3(x+1)+9x = 2x(x+1)-6$

2. Resuelve la ecuación:

1. $\frac{x+3}{2} - \frac{2x+3}{4} = 1 - \frac{x+2}{8}$
2. $x - \frac{x-3}{4} - \frac{2x+1}{6} = \frac{x+2}{3}$
3. $\frac{3x+2}{4} - \frac{17x-1}{12} + \frac{x+1}{2} = 1$
4. $x - \frac{x-1}{3} - \frac{2x+13}{18} = \frac{3x-2}{6}$
5. $\frac{x-3}{9} - \frac{18x-7}{27} + \frac{2x+3}{3} = 1$
6. $\frac{2}{3}(x-1) - \frac{4x-5}{12} = \frac{2x-1}{2} - x$
7. $2 - \frac{3}{2}(x+1) - \frac{4}{5} = \frac{2x-1}{5} - 2x$
8. $\frac{2}{15}(5x-2) + \frac{x+1}{2} - \frac{x+1}{5} = x$
9. $\frac{8}{x}(x+1) - \frac{x-1}{3} - 1 = x - \frac{3x-1}{6}$
10. $x - \frac{2}{5}(x+1) - \frac{x-1}{2} - \frac{x-17}{20} = 1$
11. $3 + \frac{x-3}{2} = x - \frac{2x-3}{4} - \frac{2x-7}{8}$
12. $x - \frac{3x-2}{6} - \frac{x-3}{3} - \frac{3x-19}{30} = 2$
13. $x - \frac{x+2}{4} - \frac{x-3}{2} = \frac{3}{16}(x-5)+2$
14. $x - \frac{3x+1}{9} - \frac{23x-11}{27} = 1 - \frac{x+2}{3}$
15. $\frac{2x+3}{2} = 2x - \frac{3x+1}{5} - \frac{5x-21}{10}$
16. $\frac{x-2}{9} - \frac{2}{3}\left(\frac{x}{3} - x-1\right) + \frac{3x-2}{6} = x$
17. $\frac{x}{9} - \frac{2}{3}\left(\frac{x-3}{3} - x-1\right) - \frac{x+1}{2} - 1 = 0$
18. $2x - \frac{x-3}{2} - \frac{3x+1}{5} - \frac{16x-15}{20} = 2$
19. $\frac{3}{5}(x+1) + \frac{3x+1}{2} - \frac{2x+1}{5} - 2x = 1$
20. $\frac{4}{5} - \frac{2}{5}\left(\frac{x+3}{2} - 2x-3\right) - \frac{2x+1}{4} = 1$
21. $2x - 3\left(\frac{x}{2} - \frac{x+1}{4}\right) - \frac{2}{3}x = \frac{x-3}{2} + 2$
22. $\frac{22}{3}x - 3\left(3x - \frac{2x+1}{2}\right) - \frac{3x+1}{3} = 1$
23. $\frac{2}{3} + 3\left(\frac{3x+1}{2} - 2x+1\right) + \frac{x-2}{3} + x = 4$
24. $3\left(2x - \frac{2x-3}{2}\right) - \frac{12}{5}x - \frac{2}{5}(x+1) = 4$

3. Resuelve la ecuación:

1. $\frac{x-1}{x+1} - \frac{x^2+x+3}{x^2-1} + \frac{x+1}{x-1} = 1$
2. $2 - \frac{x-3}{2x+2} - \frac{x+5}{x+2} = \frac{x+1}{2x+4}$
3. $\frac{x-1}{x+1} + \frac{x+1}{x-1} = 3 - \frac{x^2+x-4}{x^2-1}$
4. $\frac{x-1}{x+1} + \frac{x+5}{x} - \frac{x^2+x+4}{x^2+x} = 1$
5. $3 - \frac{x^2+x+3}{x^2-2x} - \frac{x-5}{x-2} = \frac{x+1}{x}$
6. $\frac{x+2}{x+1} + \frac{x}{x-1} = 3 - \frac{x^2+x+1}{x^2-1}$
7. $3 - \frac{x-1}{x-2} - \frac{x^2+x-7}{x^2-4} = \frac{x+1}{x+2}$
8. $\frac{x+1}{x} + \frac{x^2+x-7}{x^2+3x} + \frac{x+7}{x+3} = 3$
9. $\frac{x+1}{x-1} + \frac{x+3}{x+2} + \frac{x^2+x-3}{x^2+x-2} = 3$
10. $\frac{x^2+x+3}{x^2-3x} + \frac{x-7}{x-3} + \frac{x+1}{x} = 3$
11. $2 - \frac{x-6}{2x-1} - \frac{x^2+x+2}{2x^2-x} = \frac{x+1}{x}$
12. $3 - \frac{x^2+x+1}{x^2-3x+2} - \frac{x-7}{x-2} = \frac{x+1}{x-1}$
13. $3 - \frac{x^2+x-25}{x^2-9} - \frac{x-1}{x-3} = \frac{x+1}{x+3}$
14. $\frac{x-1}{x-3} + \frac{x^2+x-19}{x^2-9} + \frac{x+1}{x+3} = 3$
15. $\frac{x-3}{x+2} + \frac{x+1}{x-3} = 3 - \frac{x^2+x-28}{x^2-x-6}$
16. $2 - \frac{x-6}{2x-4} - \frac{x^2+x+2}{2x^2-4x} = \frac{x+1}{x}$
17. $\frac{x+1}{x} + \frac{x+4}{2x+6} + \frac{x^2+x-5}{2x^2+6x} = 2$
18. $\frac{1}{9} - \frac{2x+39}{18x+18} = \frac{x-1}{x+1} + \frac{6x-5}{6x-6}$
19. $\frac{1}{6x} + \frac{6x-5}{6x^2+6x} = \frac{5}{3x+3} - \frac{1}{x}$
20. $\frac{2x+7}{2x+4} + \frac{2x-7}{2x-4} = 3 - \frac{x^2+x+1}{x^2-4}$

4. Resuelve la ecuación:

1. $3(x-1)+1 = x(3x+1)-5x$
2. $9x-3(2x+1)+7 = x(x+3)$
3. $3(3x-3)-3x(x+3) = 7x-5$
4. $3(2x-2)-3(3x^2+2x) = 10$
5. $3x(2x+2)-3(x-1)-1 = 10x$
6. $3(x+1)+3(3x-3)-x^2 = 9x-4$
7. $3(3x-2)-x(3x+3)+x = x^2-3$
8. $3x(x+2)-x^2-12x = 3x(x-3)$
9. $3(2x-1)+2(x-1)-x^2-6x = 12$
10. $3(x-1)-2x^2-9 = 3x-x(3x-1)$
11. $3x-2(2x+2) = 4x^2-2(x^2+2)$
12. $4-2(2x+1)-x^2 = 4x-3(2x-1)$
13. $4x^2-x(3x+3)-3(x-1) = 1-4x$
14. $9x-2(x-1)-6x^2-3(2x-3) = 9$
15. $2x(2x+2)-3x = 2x(3x+2)-2$
16. $2(x+1)+3x(x-1)-2x^2-2x = 0$

17. $3x^2 - x(2x-3) - 3(x-1) - 2x = 3$ 18. $5x^2 - 2x(x+3) + 4x = x(x-1) + 1$ 19. $x(x-3) + 2x(x-1) + 2x = 5x^2 + 1$ 20. $2(3x+2) + 3(x^2-x) - x^2 = 1 - 4x$
 21. $2x(3x+3) - 3(x+1) - 7x^2 = x - 2$ 22. $11x - 3x(x+3) - 2(x+1) = x^2 - 11$ 23. $17x - 3x(x+2) = 9x^2 - 2(3x-3)$ 24. $2(2x+3) - 2(x-2) - 9x^2 = 2x + 6$

5. Resuelve la ecuación:

1. $\frac{5}{6}x(x-2) - 2 = \frac{3}{2}x(x+1)$ 2. $\frac{3}{4} - \frac{x(x-2)}{2} - \frac{x(x+4)}{16} = 1$ 3. $\frac{2x^2-1}{2} - \frac{x+4}{8} = \frac{17}{16}x^2 - 1$
 4. $\frac{2}{3} + \frac{x(2x+3)}{4} - \frac{x(x-3)}{6} = 1$ 5. $\frac{2x+3}{6} + \frac{3x^2+1}{2} - \frac{17}{12}x^2 = 1$ 6. $\frac{2}{3} + \frac{x^2+3}{9} - \frac{2}{27}x(2x-1) = 1$
 7. $\frac{x(3x+2)}{3} - \frac{7}{6}x^2 = x - \frac{3x+1}{12}$ 8. $\frac{x^2+1}{2} - \frac{7x-4}{8} - \frac{7}{16}x^2 + x = 1$ 9. $\frac{2}{3}x - x - 2 = \frac{7}{6}x^2 - \frac{x(2x+3)}{2}$
 10. $\frac{3}{2}x(x+1) - \frac{2x^2-9}{12} - \frac{13}{6}x = 1$ 11. $(x+1)\left(3x - \frac{3x+1}{2}\right) - \frac{x-1}{6} = x^2$ 12. $\frac{5}{6}x^2 + \frac{x(x-1)}{3} - \frac{4}{9}(x-1) = x^2$
 13. $\frac{2}{5} - \frac{21}{10}x^2 = x - x\left(3x - \frac{3x-1}{2}\right)$ 14. $\frac{3}{5}x + \frac{x(x+1)}{2} - \frac{3}{10}(x^2+1) = x$ 15. $\frac{13}{12}x^2 - \frac{x(3x-1)}{3} - \frac{x-2}{4} - 1 = 0$
 16. $\frac{4x+1}{6} + \frac{3x^2+1}{2} - \frac{19}{12}x^2 - x = 1$ 17. $\frac{3}{2} + x\left(3x - \frac{x+3}{2}\right) + \frac{19}{8}x = 4x^2$ 18. $\frac{21x-2}{30} - x = \frac{x(2x-1)}{5} - \frac{7}{15}x^2$
 19. $2x^2 - \frac{x^2+2}{5} - \frac{19}{10}x = \frac{3}{2}x(x-1)$ 20. $x\left(\frac{2x-1}{2} - x + 3\right) + \frac{2}{3}(x-1) = 2x^2$ 21. $\frac{23x^2+4}{30} - \frac{11}{15}x = x^2 - \frac{x(x+3)}{6}$
 22. $x^2 - \frac{9x^2+1}{10} = \frac{3}{4}x - x\left(\frac{x}{4} - \frac{x-1}{2}\right)$ 23. $\frac{7}{8} + \frac{x}{2}\left(x - \frac{3x-3}{4}\right) + \frac{x(x+2)}{24} = 1$ 24. $(x-1)\left(2x - \frac{3x+2}{2}\right) - 1 = \frac{x-2}{3} - \frac{x}{2}$

6. Resuelve la ecuación:

1. $\frac{x^2+x-3}{x^2-4} + \frac{x-1}{x-2} + \frac{x+1}{x+2} = 1$ 2. $\frac{x+2}{x-3} + \frac{x+1}{x+2} = 2 - \frac{x^2+x-7}{x^2-x-6}$ 3. $\frac{x-1}{x+1} - \frac{x-7}{x-1} - \frac{x^2-x+12}{x^2-1} = 1$ 4. $\frac{x+3}{x+2} + \frac{x-7}{x-1} + \frac{x^2+x+1}{x^2+x-2} = 6$
 5. $\frac{x+8}{1-x} - \frac{x+2}{x+1} - \frac{x^2+x+1}{x^2-1} = 1$ 6. $\frac{x+2}{x-3} + \frac{x^2+x-9}{x^2-x-6} + \frac{x+1}{x+2} = 2$ 7. $\frac{2}{3} - \frac{x^2+x+1}{3x^2-12x+9} = \frac{3x-5}{3x-9}$ 8. $9 - \frac{x-7}{x} - \frac{x^2+x-18}{x^2-2x} = \frac{x+1}{x-2}$
 9. $\frac{x+1}{x+2} + \frac{x^2+x-13}{x^2-4} + \frac{x+1}{x-2} = 1$ 10. $\frac{x-1}{3x} - \frac{3x+32}{3x-3} - \frac{1}{3} = \frac{2x-3}{x}$ 11. $\frac{x^2+x-13}{x^2-x-6} + \frac{x+1}{x+2} + \frac{x-8}{x-3} = 6$ 12. $\frac{x-7}{x} + \frac{x^2+x+23}{x^2+3x} = 1 - \frac{x+1}{x+3}$
 13. $2 - \frac{x}{x+1} - \frac{x^2+x+2}{x^2+4x+3} = \frac{x+1}{x+3}$ 14. $\frac{x-7}{x+3} + \frac{x^2+x-38}{x^2-9} + \frac{x+1}{x-3} = 2$ 15. $\frac{x-17}{x-3} + \frac{x^2+x+2}{x^2-4x+3} + \frac{x+1}{x-1} = 5$ 16. $\frac{3x-5}{9x-3} + \frac{x(x+1)}{9x^2-1} = \frac{2}{3} - \frac{x+1}{3x+1}$
 17. $\frac{2x-9}{2x-4} + \frac{2x+3}{2x+4} + \frac{x^2+x+1}{x^2-4} = 2$ 18. $\frac{x+7}{x+3} - \frac{x-1}{x+1} + \frac{(x-3)(x+2)}{x^2+4x+3} = 2$ 19. $\frac{5}{9} - \frac{9x-1}{27x-9} = \frac{1}{9}\left(\frac{8}{3} + \frac{3x+4}{9x+3}\right)$ 20. $\frac{x-6}{x+1} + \frac{x^2+x-15}{x^2-x-2} + \frac{x+1}{x-2} - 2 = 0$

7. Resuelve la ecuación:

1. $2x^2 - 3 = x^4 - 2$ 2. $x(x^3-1) + x - 2 = 79$ 3. $x^2(x^2-1) + 6 = 2 + 4x^2$
 4. $x^2(12-x^2) = 2x^2 + 9$ 5. $x + 8x^2(1-2x^2) - 1 = x$ 6. $x^3 - x^3(x+1) = 32(8-x^2)$
 7. $1 - x^2(4x^2-45) - x = 82 - x$ 8. $33 - x(5x+3) = x^4 - 3(x+1)$ 9. $x^3(x-2) = 1 + 2x^2(x^2-x-1)$
 10. $x^2(17-x^2) - (2x+1) = 15 - 2x$ 11. $x(15x-1) = 36 - x + x^2(x^2+2)$ 12. $x^3(1-17x) = 1 - x^2(8+x^2) + x^3$
 13. $x^4 + x^3 - (5x-12)(5x+12) = x^3$ 14. $14 - 71x^2 = x^2(1-9x)(1+9x) - 2$ 15. $2x(x+1) - x^4 = 2x(1-9x) + 64$
 16. $x^3(2-x) + 6x^2 = x^2(3+2x) - 4$ 17. $x^2(35-2x) + 10 = 1 + x^3(4x-2)$ 18. $x^3(1-81x) + x - 1 = x^3 + x(1-18x)$
 19. $x(1+75x) - 81 = x^2(16x^2+3) + x$ 20. $x^2(5-6x^2) - 3x^3 = 1 - x^3(2x+3)$ 21. $x^3(x-1) + 32x^2 = 1 + x^3(257x-1)$

$$22. 37x^2+2(x-8) = 2x-3x^2(1-3x^2)$$

$$23. (3x-x^2)(3x+x^2)+3x = 3x(1-x)-64$$

$$24. (x+2x^2)(x-2x^2)-3x = 4-x(16x+3)$$

8. Resuelve la ecuación:

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|----------------------------------|----------------------------------|------------------------------------|----------------------------------|
| 1. $1+3x^3+10x^2 = 7-x$ | 2. $2x(2x^2-5)-3 = 3(x+1)$ | 3. $x(x-1)-6x^3-1 = 5-12x$ | 4. $1+3x^3+2x(x-1) = x+3$ |
| 5. $6-x(x^2+6) = x^2(x+9)+x$ | 6. $5x^2+3(x-3) = 3-x+2x^3$ | 7. $12-5x(x+1)-2x = x^3-1$ | 8. $x+x^2(3x+4)+5 = 14x-1$ |
| 9. $5x-x^2(3+x)+3 = x(3+x^2)$ | 10. $13x-11x^2+6 = 3x^2(1-x)$ | 11. $9x(1-x^2)-4(1-4x^2) = x(x+1)$ | 12. $x^2(3x-4)-(10x+9) = 3(x-1)$ |
| 13. $x^2(3-x)-3x+10 = x(6-x)$ | 14. $3x-x^2(x+7)-38 = 1+28x$ | 15. $3(x+1)-2x^2 = 1+x^2(6x+9)$ | 16. $x^3(3-2x)-2(1+x) = x-4x^2$ |
| 17. $18+x^3(2x+3) = 14x^2+9x$ | 18. $x^3+7(3x^2+1)-25x = 1+3x^4$ | 19. $2x+3x^2(x-3) = x^3+6-11x$ | 20. $3x^2(1-2x)-2x = 6-16x^2-x$ |
| 21. $x^2(8-x)-39 = x^3(x+1)-34x$ | 22. $4-x^2(3x-13)-14x = 1-x$ | 23. $x^2(x+9)+28x+37 = -3x-2$ | 24. $3x^3-19x-12 = 1+x^2(7+4x)$ |

9. Resuelve la ecuación:

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|------------------------------------|-----------------------------------|------------------------------------|------------------------------------|-------------------------------------|
| 1. $\sqrt{4x+9}-7 = 3x$ | 2. $x-\sqrt{2x^2-14} = 1$ | 3. $\sqrt{2x+14}-3x = 1$ | 4. $\sqrt{3x+7}-x-3 = 0$ | 5. $\sqrt{3x^2-3}+1 = 2x$ |
| 6. $\sqrt{9x^2+3}-1 = 3x$ | 7. $\sqrt{3x^2+13}-5 = x$ | 8. $\sqrt{4x+12}-2x = 2$ | 9. $3x+7 = \sqrt{x^2+15}$ | 10. $\sqrt{2x+18}-3x = 7$ |
| 11. $x-\sqrt{4x-11}-2 = 0$ | 12. $2\sqrt{2x+6}-2x = 3$ | 13. $\sqrt{1-3x^3}+3x = -1$ | 14. $4x+5 = 4\sqrt{4x+2}$ | 15. $3x-5 = \sqrt{3x^2-11}$ |
| 16. $\sqrt{2x}+2 = \sqrt{2x+8}$ | 17. $3x-x\sqrt{13-6x} = 4$ | 18. $2\sqrt{2x+17}-9 = 2x$ | 19. $3x-8 = \sqrt{3x^2-26}$ | 20. $\sqrt{3x+12}-2 = \sqrt{3x}$ |
| 21. $\sqrt{2x+14}-3x-1 = 0$ | 22. $\sqrt{3x^2+13}-x-5 = 0$ | 23. $3x-11 = \sqrt{3x^2-47}$ | 24. $\sqrt{4x+10}-1 = \sqrt{4x+5}$ | 25. $\sqrt{4x+11}-1 = \sqrt{2x+5}$ |
| 26. $\sqrt{x+13}-\sqrt{x+1}-2 = 0$ | 27. $\sqrt{3x+3}+1 = 2\sqrt{x+2}$ | 28. $\sqrt{3x+11}-2 = \sqrt{3x+3}$ | 29. $\sqrt{3x+7}-\sqrt{3x+2} = 1$ | 30. $\sqrt{2x-1}-\sqrt{3x+1}+1 = 0$ |
| 31. $\sqrt{4x+13}-2\sqrt{x+2} = 1$ | 32. $\sqrt{x+17}-\sqrt{3x+4} = 3$ | 33. $\sqrt{x+17}-\sqrt{2x+6} = 2$ | 34. $2-\sqrt{3x-8} = \sqrt{x-2}$ | 35. $\sqrt{2x+2} = \sqrt{3x+10}$ |

- Soluciones -

- 1.1. c.i. 1.2. -3 1.3. c.i. 1.4. -4 1.5. 0 1.6. -2 1.7. 0 1.8. 3 1.9. $\frac{-1}{4}$ 1.10. 0 1.11. $\frac{3}{4}$ 1.12. $\frac{4}{3}$ 1.13. $\frac{-4}{3}$ 1.14. $\frac{1}{2}$ 1.15. -1 1.16. c.i. 1.17. inc.
 1.18. -1 1.19. 1 1.20. $\frac{-3}{4}$ 2.1. 0 2.2. 1 2.3. $\frac{1}{2}$ 2.4. 1 2.5. $\frac{2}{3}$ 2.6. $\frac{-3}{4}$ 2.7. 1 2.8. 1 2.9. -1 2.10. 1 2.11. $\frac{1}{2}$ 2.12. $\frac{1}{2}$ 2.13. 1 2.14. $\frac{1}{4}$ 2.15. 4
 2.16. -2 2.17. 3 2.18. $\frac{-1}{2}$ 2.19. $\frac{-1}{3}$ 2.20. $\frac{-3}{2}$ 2.21. -3 2.22. $\frac{-1}{2}$ 2.23. 3 2.24. $\frac{-1}{2}$ 3.1. 0 3.2. 3 3.3. inc. 3.4. $\frac{-1}{3}$ 3.5. -1 3.6. $\frac{-2}{3}$ 3.7. -1 3.8. $\frac{4}{3}$
 3.9. $\frac{-2}{3}$ 3.10. inc. 3.11. inc. 3.12. 0 3.13. 4 3.14. -2 3.15. -1 3.16. inc. 3.17. -1 3.18. -2 3.19. $\frac{-2}{3}$ 3.20. 1 4.1. $\frac{1}{3}$ 4.2. -2,2 4.3. $\frac{-4}{3}$, -1 4.4.
 s.s.r. 4.5. $\frac{1}{2}$, $\frac{2}{3}$ 4.6. 1, 2 4.7. $\frac{3}{4}$, 1 4.8. 0, 3 4.9. s.s.r. 4.10. -3, 4 4.11. $\frac{-1}{2}$, 0 4.12. -1 4.13. s.s.r. 4.14. $\frac{-1}{2}$, $\frac{2}{3}$ 4.15. -2, $\frac{1}{2}$ 4.16. 1, 2 4.17. 0, 2
 4.18. $\frac{-1}{2}$, 1 4.19. -1, $\frac{-1}{2}$ 4.20. -3, $\frac{-1}{2}$ 4.21. 1 4.22. $\frac{-3}{2}$, $\frac{3}{2}$ 4.23. $\frac{2}{3}$, $\frac{3}{4}$ 4.24. $\frac{-2}{3}$, $\frac{2}{3}$ 5.1. -4, $\frac{-3}{4}$ 5.2. $\frac{2}{3}$ 5.3. -2, 0 5.4. -4, $\frac{1}{4}$ 5.5. -4, 0 5.6. 0, 2 5.7. -1,
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