

1. Resuelve la ecuación:

[$ax^2+c=0$]

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

2. Resuelve la ecuación:

[$ax^2+bx=0$]

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

3. Resuelve la ecuación:

[Dos sol.]

1. $7x^2-2x(x+1)+1 = 3x(x+2)-5x$
2. $x(x-2)+14x+2 = 3(3x+1)-3x^2$
3. $2x^2-8x-7 = 2x(2x-1)-3(x+3)$
4. $3x(x-2)-2x(3x-3)-2 = x-4x^2$
5. $13x^2-x(x-2)-2x(3x+3) = x+6$
6. $3x^2-3x(x-2)+2x = 3x(x+3)-2$
7. $2x^2-2(2x-3)-2(x-2) = 13-11x$
8. $3x(x+2)-2(x^2-3x)-11x = 1-x^2$
9. $2x(3x-2)-6x^2-x = 1-3(2x^2-1)$
10. $21x-3(x+1)-3x(2x+3) = 1-4x^2$
11. $2x^2-3x-11 = 3x(x-3)+3(3x-3)$
12. $2(2x^2+x)-3(2x^2-3x)-8x-1 = 0$
13. $4x^2-3(3x-2)+4x = 12-3(2x+1)$
14. $3(2x+1)-3(x^2+3x)+6x^2 = 5-4x$
15. $3(3x-2)-10x = 8x^2-3(2x^2-2x)$
16. $2(3x^2-3x)-3(3x-2)+14x = 8x^2$
17. $x(2x-2)+3(3x^2+x)-9x^2 = 4-6x$
18. $2x(2x+2)-2(2x-2)+7x-2 = 8x^2$
19. $6x^2-2(2x+1)-18x = 13-2(x+3)^2$
20. $3(x^2+x)-3x(3x-2)-14x = 1-2x^2$
21. $x(3x+2)-3x(x+1)+3x^2 = 12x-12$
22. $2(2x+3)-3x^2-10 = 2x-2x(3x-3)$
23. $13x-2x(3x+3)+3 = 2(2x+1)-8x^2$
24. $3x^2(x-1)-3x^2(x-2)-7x^2 = 6-11x$
25. $3x(2x-2)+3(x^2-2x)-3x^2+7x = 4$
26. $1-3x-3x(3x+1) = 3(x^2-x)-17x^2$
27. $2x^2+9x+13 = 2x(2x-2)+3(2x+3)$
28. $18x^2-3x(3x-1)-9x = 2x(3x-2)+1$
29. $2x(3x-3)+11x+10 = 4x^2-2(3x+1)$
30. $2x(2x-3)-3(x^2+3x)-3x^2 = 1-12x$
31. $4x^2-3x(2x+2)+17x = 3(2x+1)-15$
32. $3x(3x-3)-2(2x^2-2x)-2 = x^2-12x$
33. $3(2x-3)-2x^2-12x+12 = 2x(3x-2)$
34. $2x^2(2x-3)+x+3 = 2(2x^3-x^2)-2x^2$
35. $3(3x+2)+3(3x^2-3x)-17x = 5x^2+2$
36. $14x^2-3(3x^2+x)-4x = 2(3x^2-1)+14$
37. $2(3x^2-3x)-3(x-3)+16x = 8x^2+10$
38. $3(3x+3)-2(2x^2-2x)+2x^2 = 10x+10$
39. $3(3x^2-x)-13x^2+12 = 2x-3(2x^2-2x)$
40. $3x^2(2x+2)-2x^2(3x-2)+7x+3 = 16x^2$
41. $2x(2x^2+2)+2x^3+16 = 3x(2x^2+x)-4$
42. $3(3x^3+x)+15x^2+8 = 3(3x^3+2x^2)-15x$

4. Resuelve la ecuación:

[Sol. doble]

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

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

$$19. 2x(2x-2)-2(2x^2+x)-9x^2+12x = 1$$

$$22. 2x(x-3)-12x^2+11x = 16-3x(3x+1)$$

$$17. 5x^2-2(3x+3)+4x = 2(3x^2-2x)-5$$

$$20. 2x(3x-1)+7x^2+9 = 3x(3x+1)-17x$$

$$23. 14x^2-22x+9 = 2(2x^2-x)-2(3x^2-2x)$$

$$18. 3(2x+3)+2x(2x+3)-5x^2-25 = 4x$$

$$21. 17x^2-2x(2x-2)-5 = 3(3x^2-2)+8x$$

$$24. 13x^2-2(3x^2+3x)+12x = 2(3x^2+2x)-1$$

5. Resuelve la ecuación:

[Sin sol. $ax^2+c=0$]

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

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

$$7. 7x^2-8x-9 = 3(3x^2-2x)-x(x+2)$$

$$10. 8x^2+15x-4 = 3x(x+3)+2x(3x+3)$$

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

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

$$8. 12x-10x^2+2 = 3(x+1)-3x(3x-3)$$

$$11. x^2(2x+1)-3x^2-1 = 4x^3-2x(x^2-x)$$

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

$$6. 7x^2-8x+1 = 2x(3x-3)-x(3x+2)$$

$$9. 5x^2-x(2x+2)-2x+16 = 2(x^2-2x)$$

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

6. Resuelve la ecuación:

[Sin sol.]

$$1. x(3x-2)+x^2-8x+25 = x(3x-2)$$

$$4. 2(3x^2-x)-3x(x-2)-4x^2-6x = 5$$

$$7. 2x(3x+1)+3x(x-3)-2 = 10x^2-9x$$

$$10. 5x^2-3(2x^2+3x)+2x = 1-3(3x-3)$$

$$2. 3(2x+3)-4x^2-2x = 11-3x(x-2)$$

$$5. 4x^2-x(3x-3)-17 = 2(x^2+2x)+x$$

$$8. x^2(3x-2)-x^2(x-1)+6x = 2x^3+25$$

$$11. 5-5x^2-12x = x(3x-1)-3(3x^2+3x)$$

$$3. 3x(2x-1)-x(2x+3)-3x^2+13 = 0$$

$$6. 2x^2+12x+10 = 3x(x+3)-x(2x-1)$$

$$9. 2(x^2-2x)+2(3x-3)+6x-19 = 3x^2$$

$$12. 2(x^2+x)+8x^2-16x = 3x(3x-2)-17$$

7. Resuelve la ecuación:

[$ax^2+c=0$]

$$1. \frac{x(2x-3)}{5} + \frac{3}{10}(2x+3) = 2x^2$$

$$4. \frac{3}{4}x + \frac{x(x-1)}{4} - \frac{3}{10}(x^2+3) = x$$

$$7. \frac{5}{8}x^2 - \frac{x(2x+3)}{4} - \frac{2x-7}{8} + x = 1$$

$$10. \frac{23}{27} - \frac{x(x+2)}{9} + \frac{2}{27}x(2x+3) = 1$$

$$13. \frac{18x+23}{24} - \frac{x(x-1)}{4} + \frac{11}{12}x^2 - x = 1$$

$$16. \frac{5}{24}x^2 - \frac{x(x+1)}{4} + x+1 = \frac{18x+23}{24}$$

$$19. \frac{x}{2} - \frac{2}{15}(2x+1)(2x-1) = x - \frac{x(x+1)}{2}$$

$$22. \frac{x(3x-1)}{3} - \frac{2}{27}(9x+13)+1 = \frac{4}{3}x^2 - x$$

$$2. x - \frac{x(x+2)}{4} - \frac{4x-7}{8} = 1 - \frac{3}{8}x^2$$

$$5. 1 - \frac{1}{2} - x = \frac{x}{2}\left(\frac{x}{3} - x - 2\right) + \frac{11}{9}x^2$$

$$8. \frac{5}{6}x^2 + x+1 = \frac{4x+5}{6} + \frac{x(3x+1)}{3}$$

$$11. \frac{(x+1)(x-1)}{8} - 2x\left(x - \frac{2x+3}{2}\right) = 3x$$

$$14. \frac{4x+7}{8} + \frac{3}{2}x(x+1) - \frac{11}{8}x^2 - 2x = 1$$

$$17. \frac{x(2x-1)}{10} - \frac{18x-19}{20} - \frac{3}{20}x^2 = -x+1$$

$$20. \frac{x-1}{2}\left(x - \frac{2x-3}{3}\right) - \frac{x(5x-16)}{24} + \frac{7}{6} = x$$

$$23. \frac{10x^2+4x+3}{8} - \frac{x^2-2}{4} - \frac{x(x-1)}{2} - x = 1$$

$$3. \frac{11}{12} + \frac{x(2x-1)}{2} + \frac{x(2x+3)}{6} = 1$$

$$6. \frac{4}{5} + \frac{x(2x+3)}{10} - \frac{3}{20}x(x+2) = 1$$

$$9. \frac{x(3x+2)}{6} + \frac{x(x+2)}{3} + \frac{3}{8} - x = x^2$$

$$12. \frac{3x^2-2x+2}{6} + \frac{x^2+1}{2} - \frac{x(x-1)}{3} = 1$$

$$15. \frac{x(2x-3)}{2} - \frac{5x+1}{10} + 2x+1 = \frac{13}{5}x^2$$

$$18. 1 - \frac{x+8}{12} = \frac{11}{24}x^2 - \frac{x+2}{3}\left(\frac{x}{2} - \frac{x+1}{4}\right)$$

$$21. \frac{2}{27}(9x+13) - \frac{x(x-1)}{3} + \frac{10}{27}x^2 - x = 1$$

$$24. \frac{7}{8} + 3x\left(\frac{2x-3}{2} - 3x-2\right) + \frac{21}{2}x+8x^2 = 1$$

8. Resuelve la ecuación:

[$ax^2+bx=0$]

$$1. \frac{x(x+6)}{12} - \frac{x(2x+1)}{4} + \frac{x(x+2)}{3} = x$$

$$4. \frac{3}{5}x(x-1) - \frac{3}{2}x(x+1)+x^2 = \frac{x}{10} - 2x$$

$$7. \frac{14}{15}x + \frac{3}{5}x(x+1) - \frac{3}{2}x(x-1)+x^2 = 3x$$

$$10. \frac{3x-2}{2}\left(\frac{3x}{2} - 3x-2\right) + \frac{17}{8}x^2 = 2 - \frac{13}{8}x$$

$$13. \frac{x(3x-2)}{8} + \frac{x(2x-3)}{4} = x^2 - \frac{x(6x+19)}{16}$$

$$2. x^2 - \frac{x(3x-1)}{5} - \frac{x(x-1)}{5} = \frac{x(x+2)}{6}$$

$$5. \frac{x(2x+3)}{3} - \frac{x(13x-8)}{24} - \frac{x(x+1)}{4} = x$$

$$8. \frac{x(3x+16)}{10} + \frac{x(2x-3)}{2} - \frac{x(x-1)}{5} = x^2$$

$$11. \frac{2}{5}x(x+1) + \frac{x(3x+2)}{6} + \frac{x(x+1)}{5} - x^2 = x$$

$$14. 2x^2 - \frac{x(9x-23)}{20} - \frac{x(x-3)}{10} = \frac{3}{2}x(x+1)$$

$$3. \frac{x(x+1)}{2} - x^2 = \frac{x(x+3)}{4} - \frac{x(4x+1)}{8}$$

$$6. \frac{x(x+8)}{12} + \frac{x(x+3)}{3} + \frac{3}{2}x(x-1) = 2x^2$$

$$9. \frac{x(11x+13)}{24} + \frac{x(3x-2)}{8} + \frac{x(x-1)}{3} = x^2$$

$$12. \frac{x(x+3)}{2} + \frac{x(x-2)}{5} - x^2 = 2x - \frac{2}{5}x(x+2)$$

$$15. \frac{x(x-3)}{8} - \frac{x(9x-23)}{16} + 2x^2 = \frac{x(3x+2)}{2}$$

$$16. \frac{3}{8}x - (x+2)\left(\frac{x-1}{2} - 2x+3\right) + 5 = \frac{13}{8}x^2 + x$$

$$19. \frac{6-5x^2}{20} - \frac{x+1}{5}\left(\frac{2x-1}{2} - 2x-3\right) - \frac{11}{10}x = 1$$

$$22. \frac{x(2x+3)}{3} - \frac{x(x-3)}{9} - 2x = x^2 - \frac{x(11x+14)}{27}$$

$$17. x^2 - \frac{x(3x-1)}{6} - \frac{x(2x-1)}{9} - \frac{x(8x-11)}{18} = x$$

$$20. \frac{x(3x+2)}{8} - \frac{15}{16}x(x-1) + x^2 = \frac{x(2x+1)}{4} + x$$

$$23. \frac{3}{2}x(x-1) - \frac{11}{20}x(6x-1) - x = x\left(\frac{2x}{5} - 2x-2\right)$$

$$18. x^2 - \frac{x(3x-1)}{4} - x - \frac{x(2x-13)}{16} = \frac{x(3x-1)}{8}$$

$$21. \frac{2x^2+19x-9}{6} + 2x\left(x - \frac{x+3}{2}\right) = \frac{x^2-3}{2} + x^2$$

$$24. x^2 - \frac{x-2}{2}\left(\frac{3x-3}{2} - x-1\right) - \frac{8}{5}x = \frac{19x^2+10}{20} - 3$$

9. Resuelve la ecuación:

[Dos sol.]

$$1. \frac{x+4}{8} - \frac{x(3x-1)}{2} + \frac{11}{8}x^2 = x$$

$$4. \frac{3}{8}x(2x-1) - 1 = \frac{x(2x-1)}{3} - \frac{7}{8}$$

$$7. \frac{11}{2} + \frac{x(2x+3)}{8} - \frac{x(3x+8)}{24} = 1$$

$$10. \frac{7}{9}x^2 + \frac{x(3x-2)}{9} + \frac{3x-1}{6} = x^2$$

$$13. x^2 - \frac{11x^2-4}{16} - \frac{x(x-1)}{2} = \frac{9}{16}x$$

$$16. \frac{2x^2+1}{4} + \frac{13}{8}x-1 = 2x^2 - \frac{3}{4}x^2$$

$$19. \frac{4x^2+3}{8} + \frac{x(3x+2)}{4} - \frac{19}{16}x = x^2$$

$$22. 1 - \frac{9x+17}{18} + \frac{x(3x-1)}{3} = \frac{8}{9}x^2 - x$$

$$25. \frac{4}{9}x^2 - x+1 = \frac{x(3x+1)}{9} - \frac{17}{18}(x-1)$$

$$28. 2x^2 - \frac{2x^2-5}{6} - \frac{7}{4}x - \frac{3}{2}x(x-1) = 1$$

$$31. \frac{7}{18}x^2 - \frac{(x+1)(x-1)}{3} - \frac{16x-9}{18} + x = 1$$

$$34. \frac{2}{3}x(x-1) - \frac{2}{27}(10x^2+3) + x = \frac{16}{27}x$$

$$37. \frac{3x^2-1}{6} - \frac{x}{2}\left(\frac{x}{2} - x-2\right) - \frac{17}{12}x = x^2$$

$$40. 2x^2 - \frac{12x^2+1}{24} = \frac{5}{3}x - \frac{x}{2}\left(\frac{x+2}{4} - 3x+3\right)$$

$$2. \frac{1}{2} - \frac{x(2x-1)}{2} - \frac{4}{3}x+3x^2 = 1$$

$$5. \frac{2}{9}(x+3) + \frac{x(x-1)}{3} - \frac{7}{27}x^2 = 1$$

$$8. \frac{7x+2}{12} + \frac{2}{3}x(x+1) - \frac{7}{12}x^2 = x$$

$$11. \frac{13}{20}x^2 - \frac{3}{5}x(x-1) = x - \frac{9x-2}{20}$$

$$14. \frac{5x+6}{9} - \frac{5}{9}x^2 - x = 1 - \frac{x(2x-1)}{6}$$

$$17. \frac{x(3x-2)}{3} - \frac{2}{15}(6x^2+1) + x = \frac{x}{2}$$

$$20. \frac{13}{20}x^2 - \frac{13x+2}{20} = \frac{x(3x+2)}{5} - x$$

$$23. \frac{x(x-1)}{4} - \frac{3x^2-20}{24} + \frac{7}{24}x = 1$$

$$26. x^2 - \frac{6x^2-17}{20} - 1 = \frac{x(x-1)}{2} + \frac{11}{20}x$$

$$29. x^2 - \frac{2}{5}x(x+1) - 1 = \frac{9x^2-8}{10} + \frac{3}{20}x$$

$$32. \frac{x(x+3)}{4} - \frac{11}{20}x - x^2 = 1 - \frac{14x^2+17}{20}$$

$$35. \frac{(3x+1)(3x-1)}{10} + \frac{x(x+1)}{5} - \frac{7}{20}x - x^2 = 0$$

$$38. \frac{5}{6} - 2x\left(\frac{3x-2}{2} - 3x+2\right) - \frac{5}{3}x(x-1) = 1$$

$$41. \frac{14x+15}{18} - \frac{x}{3}\left(\frac{2x}{3} - \frac{x+3}{6}\right) - x = 1 - \frac{5}{18}x^2$$

$$3. \frac{9}{10} - \frac{3}{10}x(x-1) = 1 - \frac{x(x+1)}{30}$$

$$6. \frac{3}{4} + \frac{x(3x+2)}{4} - \frac{11}{12}x(x+1) = 1$$

$$9. \frac{x(3x-1)}{4} - \frac{x-4}{6} - \frac{7}{12}x^2 = -x+1$$

$$12. \frac{2x^2-1}{10} - \frac{11x-19}{20} - \frac{x-1}{5} + x = 1$$

$$15. \frac{x}{2} + \frac{4}{3}(x+1)(x-1) - x = \frac{3x^2-2}{2}$$

$$18. \frac{2x^2+1}{2} - \frac{15}{16}x^2 + x-1 = \frac{14x-5}{16}$$

$$21. \frac{7}{10}x - \frac{x(x-2)}{5} - x^2 = 1 - \frac{9x^2+4}{10}$$

$$24. \frac{(x+1)(x-1)}{6} + \frac{x(x+1)}{3} - x^2 = \frac{11}{12}x$$

$$27. \frac{13}{12}x - x^2 = 1 - \frac{x(x-2)}{2} - \frac{7x^2+10}{12}$$

$$30. \frac{5}{16}x-1 = x^2 - \frac{x(3x-1)}{8} - \frac{8x^2+15}{16}$$

$$33. \frac{5x^2+18}{20} + \frac{x(3x+2)}{5} - \frac{13}{20}x - x^2 = 1$$

$$36. \frac{x^2}{10} - 3x\left(\frac{2x-3}{2} - x-1\right) + \frac{2}{5} = 7x$$

$$39. \frac{5}{6}x - 2x\left(\frac{3x-1}{2} - 2x+1\right) - \frac{2}{3}(x^2+1) = x$$

$$42. 1 - \frac{3}{16}x(2x+3) - (x-2)\left(\frac{x}{2} - \frac{2x+1}{4}\right) = \frac{9}{16}$$

10. Resuelve la ecuación:

[Sol. doble]

$$1. \frac{x(2x-1)}{2} - \frac{19}{10}x(x+1) + \frac{2}{5} = 2$$

$$4. x^2 - \frac{3x^2-1}{12} = \frac{x(2x-3)}{3} + \frac{7}{6}x$$

$$7. \frac{x^2+1}{3} - x-1 = \frac{7}{24}x^2 - \frac{5}{6}(x+1)$$

$$10. \frac{2}{3}x(2x+1) - \frac{23}{24} = \frac{x(2x+1)}{3} - 1$$

$$2. \frac{x^2-2}{3} - \frac{6x+11}{12} + x+2 = \frac{x+2}{6}$$

$$5. 1 + \frac{x(2x+3)}{4} - \frac{5}{12}x(x+3) = \frac{1}{4}$$

$$8. 2x - \frac{17}{16}x^2 - \frac{x-3}{4} = 1 - \frac{x(x-2)}{2}$$

$$11. 2x - \frac{3}{2}x(x+1) = \frac{6x+1}{16} - \frac{23}{16}x^2$$

$$3. \frac{x(13x-1)}{15} + \frac{x^2-2}{6} + \frac{11}{30} = x^2$$

$$6. \frac{2x^2+1}{2} - \frac{5}{6}x^2 - x = 1 - \frac{2}{3}(x+1)$$

$$9. \frac{x(2x-3)}{4} + \frac{13}{12}x+1 = \frac{11x^2+8}{24}$$

$$12. \frac{2}{9}x - \frac{2}{27}(3x^2+8) - \frac{x(x+1)}{9} = x$$

$$13. \frac{x(2x+3)}{2} - \frac{7}{3}x^2 - 1 = x - \frac{2x+11}{12}$$

$$16. x - \frac{4}{5}x^2 - \frac{17x-19}{20} + \frac{x(3x-1)}{4} = 1$$

$$19. \frac{3}{16}(4x+5) - \frac{x(x-3)}{4} - x = \frac{3}{4}x^2 + 1$$

$$22. \frac{x^2-11}{20} + 1 = -3x\left(\frac{2x+1}{2} - x - 2\right) - \frac{21}{5}x$$

$$14. \frac{x^2-2}{12} + \frac{7}{24}x^2 + 1 = x - \frac{18x-19}{24}$$

$$17. x - \frac{2x-17}{18} - \frac{x(2x+3)}{3} = 1 - \frac{11}{18}x^2$$

$$20. x^2 - \frac{x(17x+16)}{24} + x = \frac{2x^2-1}{8} - \frac{13}{24}$$

$$23. \frac{5x^2+3}{8} - \frac{3x-2}{3}\left(\frac{x}{4} - x + 1\right) + \frac{7}{4}x - x^2 = 1$$

$$15. \frac{5}{4}x - \frac{3}{4}x(x+1) + x = \frac{2x-17}{18} + 1$$

$$18. \frac{x(x-3)}{12} - \frac{12x-23}{24} - \frac{11}{24}x^2 + x = 1$$

$$21. \frac{x(3x+1)}{6} - \frac{13}{24}x^2 - x = 1 - \frac{18x+23}{24}$$

$$24. \frac{11-17x^2}{30} - \frac{x+2}{3}\left(\frac{x}{5} - 2x - 1\right) - \frac{22}{15}x = 1$$

11. Resuelve la ecuación:

[Sin sol. $ax^2+c=0$]

$$1. \frac{11}{20}x^2 - \frac{2x-1}{5} - 1 = \frac{x(3x-2)}{5}$$

$$4. 2x - \frac{3x-1}{6} = \frac{5}{6}x^2 - \frac{x(2x-3)}{2}$$

$$7. \frac{x(2-3x)}{4} - \frac{x(x-10)}{20} = x + \frac{9}{20}$$

$$10. \frac{16x+19}{24} + \frac{2x^2+3}{12} + \frac{x+1}{3} - x = 1$$

$$2. \frac{x^2}{6} - \frac{2}{3}x(x-1) - \frac{2}{3}(x+4) = x^2$$

$$5. x - \frac{19}{18}x^2 - \frac{5x-3}{6} = 1 - \frac{x(x-1)}{6}$$

$$8. \frac{5}{6} + \frac{5}{6}x^2 - 2x = 2x\left(x - \frac{x+2}{2}\right) + 1$$

$$11. \frac{x}{4}\left(\frac{3x}{2} - x - 2\right) - \frac{x}{2} - \frac{11}{16}x^2 + x = 1$$

$$3. \frac{15x^2-1}{20} + \frac{x(x-2)}{5} + \frac{2}{5}x = x^2$$

$$6. \frac{2x^2-3}{5} + x^2 = \frac{3}{10}x^2 + \frac{3x^2-1}{2}$$

$$9. \frac{3}{5}(x+1) - \frac{11}{10}x^2 - x = 1 - \frac{x(x+2)}{5}$$

$$12. \frac{x(3x+1)}{2} - \frac{7}{4}x^2 - x = 1 - \frac{8x+15}{16}$$

12. Resuelve la ecuación:

[Sin sol.]

$$1. x - \frac{17}{8} = \frac{x(3x-1)}{4} - \frac{x(5x-2)}{8}$$

$$4. x - \frac{9x-5}{10} - \frac{3}{20}x^2 + \frac{x(x+2)}{10} = 1$$

$$7. 1 - \frac{17x^2+5}{30} = \frac{x(2x-1)}{15} - \frac{2x^2-3}{3}$$

$$10. \frac{2}{9}x + \frac{x(3x+2)}{6} - \frac{5}{18}(2x^2+5) = x$$

$$2. \frac{4}{9}x(x+2) + \frac{x^2+1}{2} - \frac{7}{9}x^2 = x$$

$$5. \frac{5}{18}(x^2-5) - \frac{x(x-3)}{3} = 2x - \frac{5}{9}x$$

$$8. x\left(\frac{x}{2} - x - 1\right) + x^2 + 1 = \frac{4x^2+5}{10} - \frac{7}{5}x$$

$$11. \frac{11}{12}x^2 - \frac{x(2x+3)}{2} - \frac{4x-1}{6} + 2x = 1$$

$$3. \frac{x(x+2)}{8} + x\left(x - \frac{2x-1}{2}\right) + \frac{5}{8} = x$$

$$6. \frac{2x+13}{24} + \frac{x(3x+2)}{3} - \frac{23}{24}x^2 = x$$

$$9. \frac{4}{5}(x+1) + \frac{x(3x+2)}{5} - \frac{7}{10}x^2 - x = 1$$

$$12. \frac{5}{12} - \frac{x(3x-8)}{12} + x^2 = \frac{2}{3}x(x-1) + x$$

13. Resuelve la ecuación:

[$ax^2+c=0$]

$$1. \frac{5}{3} + \frac{x+7}{x-1} - \frac{29-3x}{9x-6} = 0$$

$$4. \frac{x-7}{x-2} - \frac{x^2+x+11}{x^2-x-2} + \frac{x-1}{x+1} = 10$$

$$7. -\frac{x+1}{x-3} - \frac{x+12}{x+1} - \frac{x^2+x+49}{x^2-2x-3} = 6$$

$$10. \frac{2x^2+2x+1}{8x^2-2} + \frac{2x-3}{4x-2} + \frac{x+1}{2x+1} = 1$$

$$13. \frac{10}{3} - \frac{x-1}{x+1} = \frac{x+10}{3x+3} - \frac{3x^2+3x-1}{3x^2-3}$$

$$16. \frac{4}{3} - \frac{3x+13}{9x-6} - \frac{(x+5)(x-4)}{3x^2+7x-6} = \frac{x+1}{x+3}$$

$$19. \frac{1}{4} - \frac{4x^2+4x-47}{16x^2-4} - \frac{x+1}{2x-1} = \frac{2x-3}{4x+2}$$

$$22. \frac{3x+5}{3x+3} = 2 - \frac{3x^2+3x+26}{9x^2+15x+6} - \frac{x+1}{3x+2}$$

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

$$5. \frac{8}{3} - \frac{x+3}{x+1} - \frac{x^2+x+1}{x^2+x} = \frac{3x-7}{3x}$$

$$8. \frac{2x+9}{4x+8} - \frac{4x^2+4x-21}{8x^2+12x-8} = \frac{x+1}{2x-1}$$

$$11. \frac{x+1}{x+2} - \frac{(2-x)(3+x)}{2x^2+x-6} = \frac{3}{2} - \frac{2x-1}{4x-6}$$

$$14. \frac{x+1}{x+2} = \frac{3}{2} - \frac{2x+5}{4x+6} - \frac{x^2+x-8}{2x^2+7x+6}$$

$$17. \frac{3x^2+3x+41}{9x^2+6x-3} + \frac{x+1}{3x-1} + \frac{3x+2}{3x+3} = 2$$

$$20. \frac{2x+5}{6x+6} + \frac{6x-11}{6x-18} = \frac{1}{3} - \frac{x^2+x+1}{3x^2-6x-9}$$

$$23. 8 - \frac{x^2-x+1}{2x^2+3x-9} + \frac{3x-43}{3x+9} = \frac{3x-29}{6x-9}$$

$$3. 2 - \frac{x^2+x+1}{x^2-2x} - \frac{x-5}{x-2} = \frac{x+2}{3x}$$

$$6. \frac{3}{2} - \frac{x+1}{2x-6} - \frac{4x-15}{4x-12} = \frac{2x+1}{4x-4}$$

$$9. \frac{x+1}{3x+6} + \frac{x+1}{x+2} = 1 - \frac{3x^2+3x-11}{3x^2+3x-6}$$

$$12. \frac{4}{3} - \frac{x^2+x-4}{3x^2+7x+2} - \frac{3x+7}{9x+3} = \frac{x+1}{x+2}$$

$$15. \frac{2}{3} - \frac{x+1}{3x+1} - \frac{3x^2+3x-7}{27x^2-3} = \frac{3x-4}{9x-3}$$

$$18. \frac{1}{x+2}\left(2x+6 - \frac{x^2+x-13}{x-2}\right) + \frac{x-3}{x-2} = 1$$

$$21. \frac{x+4}{3x-3} + \frac{1}{3} + \frac{x+1}{3x-6} = -\frac{x^2+x+6}{3x^2-9x+6}$$

$$24. \frac{x^2+x+1}{x^2-1} + \frac{9x-1}{9x+9} = \frac{10}{9} - \frac{x^2+x-24}{9x^2-9}$$

14. Resuelve la ecuación:

[$ax^2+bx=0$]

$$1. \frac{x+4}{x+2} = 4 - \left(2 - \frac{x}{x-3}\right)$$

$$4. \frac{1}{3} - \frac{3x^2+3x+2}{27x^2-3} = \frac{x-1}{3x-1}$$

$$7. 1 - \frac{x^2+x+1}{x^2+3x+2} - \frac{x-5}{x+2} = \frac{x+3}{x+1}$$

$$10. \frac{7-x}{x+1} - \frac{x^2+x+11}{x^2+3x+2} - \frac{x+1}{x+2} = 1$$

$$13. 4 - \frac{x^2+x-7}{2x^2-3x+1} = \frac{x-12}{2x-1} + \frac{x+1}{x-1}$$

$$16. \frac{10-3x}{3x+9} - \frac{3x-2}{3x-9} - \frac{x^2+x+1}{x^2-9} = 1$$

$$19. \frac{2x+5}{2x+2} - \frac{1}{x+2} \left(2x - \frac{x^2+x-3}{x+1}\right) = 1$$

$$22. \frac{2x+1}{4x+6} + \frac{x+1}{x+2} = \frac{3}{2} - \frac{x^2+x+5}{2x^2+7x+6}$$

$$2. 3 - \left(2 - \frac{x-5}{x-1}\right) - \frac{x-18}{2x-3} = 0$$

$$5. 1 - \frac{x^2+x+5}{x^2-5x+6} - \frac{x+1}{x-3} = \frac{x-1}{x-2}$$

$$8. \frac{x+1}{x-3} - \frac{x^2+x+24}{x^2-9} + \frac{x-1}{x+3} = 2$$

$$11. \frac{x-3}{x+3} + \frac{x+1}{x-3} - \frac{(5-x)(6+x)}{x^2-9} = 2$$

$$14. 1 - \frac{x^2+x-21}{4x^2-9} - \frac{x+1}{2x-3} = \frac{x-3}{2x+3}$$

$$17. 4 - \frac{x+1}{2x-1} - \frac{x(x+1)}{2x^2-5x+2} = \frac{x-10}{x-2}$$

$$20. \frac{2}{3} - \frac{3x-10}{9x+3} - \frac{x^2+x-5}{3x^2-2x-1} = \frac{x+1}{x-1}$$

$$23. 2 - \frac{x+1}{3x-3} - \frac{3x^2+3x-5}{3x^2-3} = \frac{3x+2}{3x+3}$$

$$3. \frac{x}{2x+2} - \frac{1}{2} + \left(2 - \frac{x-3}{x-2}\right) = 0$$

$$6. 2 - \frac{x+1}{x+3} - \frac{x^2+x-11}{x^2+2x-3} = \frac{x+2}{x-1}$$

$$9. \frac{2x+23}{4x+12} - \frac{x+1}{2x+6} - \frac{2x+3}{4x+4} = 1$$

$$12. \frac{x+1}{x+3} - \frac{1-x}{x-3} - \frac{(5-x)(6+x)}{x^2-9} = 4$$

$$15. \frac{3}{2} - \frac{x^2+x+2}{4x^2-1} - \frac{2x-5}{4x-2} = \frac{x+1}{2x+1}$$

$$18. \frac{x^2+x+3}{3x^2-11x+6} + \frac{x-6}{x-3} + \frac{x+1}{3x-2} = 2$$

$$21. \frac{5x+7}{5x+10} + \frac{5x-22}{5x-15} + \frac{x^2+x+1}{x^2-x-6} = 2$$

$$24. \frac{2x-17}{4x-2} \cdot \frac{x+1}{x-2} = \frac{3}{2} - \frac{x^2+x-13}{2x^2-5x+2} - \frac{x+1}{x-2}$$

15. Resuelve la ecuación:

[Dos sol.]

$$1. \frac{15-x}{x+2} - \frac{x^2+x-25}{x^2-4} - 1 = \frac{x+1}{x-2}$$

$$4. \frac{13-x}{x-1} - \frac{x+1}{x+2} - \frac{x^2+x+20}{x^2+x-2} = 1$$

$$7. \frac{3-x-x^2}{x^2-4x+3} - \frac{x+25}{x-3} - \frac{x+1}{x-1} = 9$$

$$10. 1 - \frac{x-7}{3x+2} - \frac{x^2+x-21}{3x^2-4x-4} = \frac{x+1}{x-2}$$

$$13. \frac{x-48}{x-3} + \frac{x+20}{x-2} + \frac{x^2+x+1}{x^2-5x+6} = 6$$

$$16. -\frac{8x+3}{8x-8} - \frac{8x+5}{8x+8} - \frac{x^2+x+1}{4x^2-4} = \frac{3}{4}$$

$$19. \frac{3}{2} - \frac{2x-1}{4x-6} - \frac{(x+4)(x-3)}{2x^2+3x-9} = \frac{x+1}{x+3}$$

$$22. -\frac{2x+3}{6x+2} - \frac{2x+9}{2x-2} - \frac{x^2+x+1}{3x^2-2x-1} = 1$$

$$25. \frac{1-x}{x+2} - \frac{3x-5}{9x-3} - \frac{x^2+x+1}{3x^2+5x-2} = \frac{1}{3}$$

$$28. \frac{x^2+x-11}{3x^2-3} - \frac{4x+17}{3x+3} + \frac{1}{3} + \frac{x+1}{x-1} = 0$$

$$31. \frac{x+50}{3x-9} + \frac{x+1}{x-3} = -3 - \frac{3x^2+3x+29}{3x^2-12x+9}$$

$$34. \frac{x^2+x-22}{x^2-3x} + \frac{x+1}{x} + \frac{x+1}{x-3} = \frac{5x+16}{2x}$$

$$2. \frac{2x+9}{2x+2} + \frac{2x-9}{2x-2} + \frac{x^2+x+1}{x^2-1} = 2$$

$$5. \frac{1+x}{1-x} - \frac{x+16}{x+1} - \frac{x^2+x+29}{x^2-1} = 5$$

$$8. -\frac{4(x-15)+8}{9(x+2)} - \frac{3x+2}{9x-9} = \frac{x+1}{x+2}$$

$$11. \frac{1}{3} - \frac{12x+31}{12x+36} = \frac{1}{12} \left(3 + \frac{x+20}{x-1}\right)$$

$$14. \frac{1}{6} \left(\frac{17}{3} + \frac{3x-1}{9x+6}\right) - \frac{x+1}{3x} = \frac{6x-1}{6x}$$

$$17. \frac{7-x}{x+2} - \frac{1}{x+2} \left(2x - \frac{x^2+x-1}{x+1}\right) = 4$$

$$20. \frac{3}{2} - \frac{x^2+x-17}{2x^2+3x-2} - \frac{x+1}{x+2} = \frac{2x+3}{4x-2}$$

$$23. \frac{4}{3} - \frac{x^2+x+12}{3x^2-8x+4} - \frac{x+1}{x-2} = \frac{3x-11}{9x-6}$$

$$26. \frac{1}{x-3} \left(2x+6 - \frac{x^2+x+2}{x-2}\right) + \frac{x-8}{x-2} = 1$$

$$29. \frac{4}{3} - \frac{3x+19}{9x+3} - \frac{x^2+x-8}{3x^2+7x+2} = \frac{x+1}{x+2}$$

$$32. \frac{3x+32}{9x+3} + \frac{x^2+x-9}{3x^2+7x+2} = \frac{2}{3} - \frac{x+1}{x+2}$$

$$35. \frac{2}{3} - \frac{3x-5}{9x-3} - \frac{x^2+x-5}{3x^2-7x+2} - \frac{x+1}{x-2} = 0$$

$$3. \frac{x-3}{x+2} + \frac{x+5}{x-1} + 9 + \frac{x^2+x+1}{x^2+x-2} = 0$$

$$6. \frac{x-1}{3x-1} - \frac{3x+2}{27x-9} = \frac{8}{9} - \frac{3x+11}{9x+3}$$

$$9. \frac{3+x}{3x-1} - \frac{(3-x)(4+x)}{3x^2+8x-3} + \frac{1+x}{x+3} = 1$$

$$12. \frac{11}{3} - \frac{x-43}{3x-3} - \frac{x^2+x-21}{x^2-3x+2} = \frac{x+1}{x-2}$$

$$15. \frac{2(x+7)}{x-2} + \frac{x^2+x+47}{x^2-5x+6} + \frac{x+1}{x-3} = 0$$

$$18. \frac{x+1}{x-2} + \frac{x+3}{3x} + \frac{x^2+x+1}{x^2-2x} = \frac{5x+2}{3x-6}$$

$$21. \frac{x-6}{3x-1} - \frac{1}{3x-1} \left(2x - \frac{x^2+x+1}{x+1}\right) = 1$$

$$24. \frac{x^2+x+1}{x^2+x-6} + \frac{5x+4}{5x+15} + \frac{5x+16}{5x-10} = -1$$

$$27. \frac{4x-15}{12x-8} + \frac{4x+5}{4x-8} + \frac{x^2+x+1}{3x^2-8x+4} = 1$$

$$30. \frac{1}{3} - \frac{3x-29}{9x-6} - \frac{x^2+x+32}{3x^2+7x-6} = \frac{x+1}{x+3}$$

$$33. 2 - \frac{3x+7}{3x+6} - \frac{3x^2+3x+23}{9x^2+21x+6} = \frac{x+1}{3x+1}$$

$$36. \frac{1}{2} - \frac{x+1}{2x-1} - \frac{4x^2+4x-5}{8x^2-20x+8} = \frac{4x-1}{4x-8}$$

$$37. \frac{x+19}{x+3} + \frac{1}{x+3} \left(2x+4 - \frac{x^2+x+1}{x-1} \right) = 4$$

$$40. \frac{2x+1}{3x} - \frac{x^2+x+4}{9x^2-3x} - \frac{x^2+x+1}{3x^2-x} = \frac{x+1}{3x-1}$$

$$38. \frac{1}{3} - \frac{3x^2+3x-25}{27x^2-12} - \frac{x+1}{3x-2} = \frac{x-3}{3x+2}$$

$$41. \frac{3}{4} - \frac{(2x+7)(2x-5)}{16x^2-36} - \frac{x+1}{2x+3} = \frac{x+3}{2x-3}$$

$$39. \frac{3}{2} - \frac{x+1}{2x-6} - \frac{2x^2+2x-25}{2x^2-8x+6} = \frac{2x-11}{2x-2}$$

$$42. \frac{2x^2+2x+5}{4x^2+18x+18} + \frac{2x+19}{2x+6} + \frac{x+1}{2x+3} = 4$$

16. Resuelve la ecuación:

$$1. \frac{x-1}{x+1} - \frac{x-19}{9x+9} + \frac{x-9}{9x-9} = 2$$

$$4. \frac{x+4}{9x+9} + \left(2 - \frac{x^2+3x+1}{x^2+2x+1} \right) = 1$$

$$7. \frac{7}{4} - \frac{x^2+x+1}{2x^2+x} - \frac{x+1}{x} = \frac{4x-1}{8x+4}$$

$$10. \frac{1-x}{x+2} - \frac{x+1}{x-3} - \frac{x^2+x+32}{x^2-x-6} = 6$$

$$13. 2 - \frac{x-18}{x+3} - \frac{x^2+x+1}{x^2+4x+3} = \frac{x+13}{x+1}$$

$$16. \frac{x+5}{x+3} + \frac{x+1}{2x+1} = 4 - \frac{x^2+x-5}{2x^2+7x+3}$$

$$19. 2 - \frac{x+1}{3x+1} - \frac{x^2+x-7}{3x^2+10x+3} = \frac{x+6}{x+3}$$

$$22. \frac{x}{x+3} + \frac{2x+9}{4x+6} = \frac{3}{2} - \frac{x^2+x+1}{2x^2+9x+9}$$

$$2. \frac{6-x}{x+1} - \frac{x^2+x-5}{x^2-1} - \frac{x+1}{x-1} = 1$$

$$5. \frac{x-4}{x+2} + \frac{x+1}{x-2} = 2 - \frac{x^2+x-17}{x^2-4}$$

$$8. -\frac{x+1}{x-2} - \frac{x+1}{x-1} - \frac{x^2+x+1}{x^2-3x+2} = 6$$

$$11. \frac{8x-23}{8x-24} = 1 - \frac{1}{8} \left(\frac{3x-26}{9x-3} + \frac{7}{3} \right)$$

$$14. \frac{x+22}{x-1} - 17 = \frac{x-1}{x+1} - \frac{x^2-x-47}{x^2-1}$$

$$17. \frac{x-9}{2x} + \frac{x^2+x-3}{x^2-x} = \frac{3}{2} - \frac{x^2+x+1}{2x^2-2x}$$

$$20. \frac{1}{3} - \frac{3x^2+3x-1}{27x^2-3} - \frac{x+1}{3x-1} = \frac{x}{3x+1}$$

$$23. \frac{3x+4}{3x+3} + \frac{1}{9x} \left(2x - \frac{x^2+x-4}{x+1} \right) = \frac{1}{9}$$

$$3. \frac{3}{2} - \frac{2x-11}{4x-2} - \frac{x+1}{x-2} = \frac{x+3}{2x-1}$$

$$6. 2 + \frac{x-1}{x+1} - \frac{x^2-x+5}{x^2-2x-3} = \frac{x-12}{x-3}$$

$$9. 2 - \frac{x-4}{x-3} - \frac{(x+2)(x-1)}{x^2-9} = \frac{x+1}{x+3}$$

$$12. \frac{x-1}{x+1} - \frac{x^2+x+17}{x^2-2x-3} + \frac{x-38}{x-3} = 17$$

$$15. -\frac{x+5}{x-2} - \frac{1}{x-2} \left(x - \frac{x^2+x-1}{2x+2} \right) = \frac{1}{2}$$

$$18. \frac{x^2+x+1}{x^2+x-6} + \frac{5x-8}{5x-10} + \frac{5x+18}{5x+15} = 2$$

$$21. \frac{3}{2} - \frac{2x-5}{4x-2} - \frac{x^2+x+1}{4x^2-1} - \frac{x+1}{2x+1} = 0$$

$$24. \frac{1-2x}{4x+2} - \frac{x+1}{x+3} - \frac{x^2+x+9}{2x^2+7x+3} = \frac{5}{2}$$

[Sol. doble]

17. Resuelve la ecuación:

$$1. \frac{x-8}{x-2} + \frac{x(x+1)}{x^2-3x+2} + \frac{x+1}{x-1} = 2$$

$$4. \frac{x-1}{3x+1} - \frac{3x-4}{27x-9} = \frac{x}{3x-1} - \frac{4}{9}$$

$$7. \frac{3x-3}{2x+2} + \frac{x^2+x+1}{x^2-1} = 1 - \frac{2x-5}{2x-2}$$

$$10. 2 - \frac{3x+4}{3x+3} - \frac{x^2+x+1}{x^2-x-2} = \frac{3x+2}{3x-6}$$

$$13. \frac{x+2}{x+1} + \frac{x-1}{2x+1} = 1 - \frac{x^2+x+1}{2x^2+3x+1}$$

$$16. \frac{x}{x+2} + \frac{1}{x+2} \left(2x - \frac{x^2+x+4}{x+1} \right) = 1$$

$$19. \frac{4x+1}{4x+4} - \frac{4x+21}{4x-12} - \frac{x^2-x+1}{x^2-2x-3} = 2$$

$$22. \frac{8x+7}{16x+8} + \frac{x^2+x+1}{4x^2-1} = \frac{3}{4} - \frac{8x+1}{16x-8}$$

$$2. 2 - \frac{x-3}{x+2} - \frac{x^2+x-22}{x^2-4} = \frac{x+1}{x-2}$$

$$5. 6 - \frac{x+1}{x-1} - \frac{(x+3)(x-2)}{x^2-1} = \frac{x}{x+1}$$

$$8. \frac{x-12}{x+1} + \frac{x+1}{x-2} + \frac{x^2+x-39}{x^2-x-2} = 6$$

$$11. \frac{x-1}{x+1} - \frac{x+1}{2x+1} - \frac{x^2-x-1}{2x^2+3x+1} = 1$$

$$14. \frac{x+1}{2x+1} = 1 - \frac{x+4}{x+3} - \frac{x^2+x-1}{2x^2+7x+3}$$

$$17. \frac{5-x}{2x+3} - \frac{x^2+x+9}{2x^2+9x+9} - \frac{x+1}{x+3} = 1$$

$$20. \frac{x^2+x+40}{2x^2+x-6} + \frac{x-14}{2x-3} + \frac{x+1}{x+2} + 1 = 0$$

$$23. \frac{x-4}{x-2} + \frac{1}{x-3} \left(2x+6 - \frac{x^2+x-4}{x-2} \right) = 1$$

$$3. \frac{x-1}{x+1} - \frac{x-5}{2x-3} - \frac{x^2-x+8}{2x^2-x-3} = 1$$

$$6. 6 - \frac{x-18}{x-3} - \frac{x^2+x+2}{x^2-4x+3} = \frac{x+1}{x-1}$$

$$9. 3 - \frac{x+2}{2x-3} - \frac{x^2+x-16}{2x^2+x-6} = \frac{x+1}{x+2}$$

$$12. \frac{x(x+1)}{2x^2-3x+1} + \frac{x-5}{x-1} + \frac{x+1}{2x-1} = 3$$

$$15. \frac{x-1}{3x-2} + \frac{x+1}{3x+2} = \frac{4}{9} - \frac{3x+1}{27x-18}$$

$$18. \frac{10-x}{2x+3} - \frac{x+1}{x+2} - \frac{x^2+x+5}{2x^2+7x+6} = 1$$

$$21. \frac{x+10}{x+1} + \frac{1}{x+2} \left(2x - \frac{x^2+x+9}{x+1} \right) = 4$$

$$24. \frac{2x-5}{2x-2} + \frac{x^2+x+1}{x^2-1} + \frac{2x+13}{2x+2} = 6$$

[Sol. falsa]

18. Resuelve la ecuación:

$$1. \frac{x}{3x+1} = 1 - \left(2 - \frac{x-4}{x-3} \right)$$

$$2. -\frac{x+1}{x-2} - \frac{x+8}{x-3} - \frac{x^2+x+14}{x^2-5x+6} = 1$$

$$3. \frac{6-x}{x-1} - \frac{x^2+x+23}{x^2+2x-3} = \frac{x+1}{x+3} + 1$$

[Sin sol. $ax^2+c=0$]

$$4. \frac{x+2}{x-1} - \frac{x^2+x+29}{x^2-1} + \frac{x-1}{x+1} = 10$$

$$7. \frac{2-x}{2+x} - \frac{x+1}{x-2} - \frac{x^2+x+47}{x^2-4} = 13$$

$$10. \frac{7-2x}{4x+4} - \frac{4x+3}{4x-4} - \frac{x^2+x+1}{2x^2-2} = \frac{5}{2}$$

$$5. \frac{x-1}{x+1} + \frac{x-14}{x-2} - \frac{x^2+x+31}{x^2-x-2} = 17$$

$$8. \frac{x+10}{x+2} + \frac{x-22}{x-3} = 12 - \frac{x^2+x+1}{x^2-x-6}$$

$$11. \frac{4-3x}{9x-6} - \frac{x+1}{3x+2} - \frac{3x^2+3x+29}{27x^2-12} = 1$$

$$6. \frac{x-1}{x+2} - \frac{1}{2} - \frac{x^2-x+10}{2x^2-x-3} = \frac{2x-9}{4x-6}$$

$$9. \frac{x+18}{3x+1} - \frac{x-1}{x+1} = 5 - \frac{x^2-x-23}{3x^2+4x+1}$$

$$12. \frac{1}{3} - \frac{1}{3x+2} \left(\frac{3x+2}{3} - \frac{2x^2-x-3}{3x-2} \right) = \frac{x-1}{3x-2}$$

19. Resuelve la ecuación:

[Sin sol.]

$$1. \frac{1}{3} - \frac{1}{3} \left(2 - \frac{x+21}{x+1} \right) = \frac{x+17}{3x}$$

$$2. \frac{x-5}{x-3} + \frac{x+1}{x+2} = 2 - \frac{x^2+x+6}{x^2-x-6}$$

$$3. 4 - \frac{x+9}{x+3} - \frac{x^2+x+1}{x^2+4x+3} = \frac{x}{x+1}$$

$$4. \frac{x-5}{x-2} + \frac{x+1}{x+3} + \frac{x^2+x+18}{x^2+x-6} = 2$$

$$5. 2 - \frac{x-1}{x+1} = \frac{x+8}{x+3} - \frac{x^2+x+1}{x^2+4x+3}$$

$$6. \frac{x-8}{x-1} - \frac{x-1}{x+1} - \frac{(2+x)(3-x)}{x^2-1} = 2$$

$$7. \frac{x+1}{x-3} + \frac{x-10}{x+1} = 2 - \frac{x^2+x-27}{x^2-2x-3}$$

$$8. \frac{4}{3} - \frac{x+4}{x} - \frac{x^2+x+1}{3x^2+x} = \frac{3x-44}{9x+3}$$

$$9. \frac{x-16}{x+3} + \frac{x+16}{x+2} + \frac{x^2+x+1}{x^2+5x+6} = 2$$

$$10. \frac{x+5}{3x-2} + 1 = \frac{2(2x+5)}{3x+2} - \frac{x^2-x-1}{9x^2-4}$$

$$11. \frac{x-1}{x+1} - \frac{x^2+x+8}{3x^2+4x+1} + \frac{3x+16}{9x+3} = \frac{4}{3}$$

$$12. \frac{4}{3} - \frac{3x-10}{9x+6} - \frac{x^2+x-4}{3x^2-4x-4} = \frac{x+1}{x-2}$$

— Soluciones —

1.1. $\pm \frac{3}{2}$ 1.2. $\pm \frac{1}{2}$ 1.3. $\pm \frac{1}{3}$ 1.4. $\pm \frac{3}{4}$ 1.5. ± 1 1.6. ± 1 1.7. ± 3 1.8. ± 1 1.9. $\pm \frac{1}{3}$ 1.10. $\pm \frac{1}{3}$ 1.11. $\pm \frac{2}{3}$ 1.12. $\pm \frac{3}{2}$ 1.13. ± 1 1.14. ± 3 1.15. $\pm \frac{1}{2}$ 1.16. $\pm \frac{1}{4}$
1.17. $\pm \frac{1}{2}$ 1.18. $\pm \frac{1}{2}$ 1.19. $\pm \frac{1}{3}$ 1.20. ± 3 1.21. ± 4 1.22. $\pm \frac{1}{2}$ 1.23. ± 4 1.24. ± 1 2.1. 0, 1 2.3. $\frac{-1}{2}$, 0 2.4. 0, $\frac{1}{3}$ 2.5. 0, $\frac{3}{4}$ 2.6. 0, 2 2.7. -4, 0 2.8. -1, 0
2.9. $\frac{-1}{2}$, 0 2.10. $\frac{-2}{3}$, 0 2.11. 0, $\frac{1}{2}$ 2.12. 0, $\frac{2}{3}$ 2.13. -3, 0 2.14. $\frac{-2}{3}$, 0 2.15. 0, 1 2.16. 0, $\frac{1}{3}$ 2.17. $\frac{-1}{3}$, 0 2.18. -1, 0 2.19. 0, $\frac{2}{3}$ 2.20. $\frac{-4}{3}$, 0 2.21. 0, $\frac{3}{2}$
2.22. -1, 0 2.23. 0, $\frac{4}{3}$ 2.24. 0, 2 3.1. $\frac{1}{2}$, 1 3.2. -1, $\frac{1}{4}$ 3.3. -2, $\frac{1}{2}$ 3.4. -1, 2 3.5. $\frac{-2}{3}$, $\frac{3}{2}$ 3.6. -1, $\frac{2}{3}$ 3.7. -3, $\frac{1}{2}$ 3.8. -1, $\frac{1}{2}$ 3.9. $\frac{-1}{2}$, $\frac{4}{3}$ 3.10. $\frac{1}{2}$, 4 3.11. -2, -1
3.12. $\frac{1}{2}$, 1 3.13. -1, $\frac{3}{4}$ 3.14. -1, $\frac{2}{3}$ 3.15. -2, $\frac{-3}{2}$ 3.16. -2, $\frac{3}{2}$ 3.17. -4, $\frac{1}{2}$ 3.18. $\frac{-1}{4}$, 2 3.19. $\frac{1}{2}$, $\frac{3}{4}$ 3.20. -1, $\frac{-1}{4}$ 3.21. $\frac{4}{3}$, 3 3.22. $\frac{-2}{3}$, 2 3.23. -1, $\frac{-1}{2}$
3.24. $\frac{3}{4}$, 2 3.25. $\frac{-1}{2}$, $\frac{4}{3}$ 3.26. $\frac{1}{2}$, 1 3.27. $\frac{-1}{2}$, 4 3.28. $\frac{-1}{3}$, 1 3.29. -4, $\frac{-3}{2}$ 3.30. -1, $\frac{-1}{2}$ 3.31. $\frac{-3}{2}$, 4 3.32. -2, $\frac{1}{4}$ 3.33. $\frac{-3}{4}$, $\frac{1}{2}$ 3.34. -1, $\frac{3}{2}$ 3.35. $\frac{1}{4}$, 4 3.36. -4, -3
3.37. $\frac{1}{4}$, $\frac{1}{3}$ 3.38. $\frac{1}{2}$, 1 3.39. $\frac{3}{2}$, 4 3.40. $\frac{-1}{3}$, $\frac{3}{2}$ 3.41. $\frac{-4}{3}$, 4 3.42. $\frac{-4}{3}$, $\frac{-2}{3}$ 4.1. -1 4.2. 1 4.3. 2 4.4. $\frac{1}{4}$ 4.5. $\frac{-1}{2}$ 4.6. $\frac{1}{2}$ 4.7. -4 4.8. 4 4.9. $\frac{-3}{2}$
4.10. $\frac{-1}{3}$ 4.11. -3 4.12. $\frac{1}{2}$ 4.13. 3 4.14. -4 4.15. -2 4.16. -4 4.17. 1 4.18. 4 4.19. $\frac{1}{3}$ 4.20. $\frac{-3}{2}$ 4.21. $\frac{1}{2}$ 4.22. 4 4.23. $\frac{3}{4}$ 4.24. -1 5.1. s.s.r.
5.2. s.s.r. 5.3. s.s.r. 5.4. s.s.r. 5.5. s.s.r. 5.6. s.s.r. 5.7. s.s.r. 5.8. s.s.r. 5.9. s.s.r. 5.10. s.s.r. 5.11. s.s.r. 5.12. s.s.r. 6.1. s.s.r. 6.2. s.s.r. 6.3. s.s.r.
6.4. s.s.r. 6.5. s.s.r. 6.6. s.s.r. 6.7. s.s.r. 6.8. s.s.r. 6.9. s.s.r. 6.10. s.s.r. 6.11. s.s.r. 6.12. s.s.r. 7.1. $\pm \frac{3}{4}$ 7.2. ± 1 7.3. $\pm \frac{1}{4}$ 7.4. ± 3 7.5. $\pm \frac{3}{4}$ 7.6. ± 2
7.7. ± 1 7.8. ± 1 7.9. $\pm \frac{3}{2}$ 7.10. ± 2 7.11. ± 1 7.12. $\pm \frac{1}{2}$ 7.13. $\pm \frac{1}{4}$ 7.14. ± 1 7.15. $\pm \frac{3}{4}$ 7.16. ± 1 7.17. ± 1 7.18. $\pm \frac{2}{3}$ 7.19. ± 2 7.20. ± 4 7.21. ± 1 7.22. $\pm \frac{1}{3}$
7.23. $\pm \frac{1}{2}$ 7.24. $\pm \frac{1}{4}$ 8.1. -1, 0 8.2. -2, 0 8.3. $\frac{-1}{2}$, 0 8.4. 0, 2 8.5. 0, $\frac{2}{3}$ 8.6. 0, 2 8.7. $\frac{-1}{3}$, 0 8.8. -3, 0 8.9. 0, $\frac{1}{4}$ 8.10. 0, 1 8.11. 0, $\frac{2}{3}$ 8.12. 0, 1
8.13. $\frac{-3}{4}$, 0 8.14. -1, 0 8.15. -1, 0 8.16. -1, 0 8.17. $\frac{-2}{3}$, 0 8.18. 0, $\frac{3}{4}$ 8.19. -4, 0 8.20. -1, 0 8.21. 0, 1 8.22. -4, 0 8.23. 0, $\frac{1}{4}$ 8.24. 0, $\frac{3}{4}$ 9.1. -4, 1
9.2. $\frac{-1}{3}$, $\frac{3}{4}$ 9.3. $\frac{1}{2}$, $\frac{3}{4}$ 9.4. -1, $\frac{3}{2}$ 9.5. $\frac{-3}{2}$, 3 9.6. $\frac{-3}{2}$, -1 9.7. -1, $\frac{2}{3}$ 9.8. -2, -1 9.9. -4, $\frac{1}{2}$ 9.10. -3, $\frac{1}{2}$ 9.11. -2, 1 9.12. -1, $\frac{-1}{4}$ 9.13. $\frac{-4}{3}$, 1 9.14. -2, $\frac{-3}{4}$
9.15. -2, -1 9.16. $\frac{2}{3}$, $\frac{3}{2}$ 9.17. $\frac{-1}{2}$, $\frac{4}{3}$ 9.18. -3, 1 9.19. $\frac{3}{4}$, 2 9.20. -1, 2 9.21. $\frac{2}{3}$, 3 9.22. -1, $\frac{-1}{2}$ 9.23. $\frac{-4}{3}$, 1 9.24. $\frac{-2}{3}$, $\frac{-1}{2}$ 9.25. $\frac{1}{2}$, 1 9.26. $\frac{-3}{4}$, 1 9.27. -2, 1
9.28. $\frac{-1}{2}$, 2 9.29. $\frac{-4}{3}$, $\frac{-1}{2}$ 9.30. $\frac{1}{2}$, 1 9.31. -3, 1 9.32. 1, 3 9.33. -1, $\frac{-2}{3}$ 9.34. -2, $\frac{-3}{2}$ 9.35. $\frac{-1}{2}$, 2 9.36. -4, -1 9.37. -1, $\frac{-2}{3}$ 9.38. $\frac{-1}{4}$, $\frac{1}{2}$ 9.39. $\frac{-1}{2}$, 4
9.40. -1, $\frac{1}{3}$ 9.41. -1, $\frac{3}{2}$ 9.42. $\frac{-1}{2}$, $\frac{-1}{3}$ 10.1. $\frac{-4}{3}$ 10.2. $\frac{-1}{2}$ 10.3. 1 10.4. 1 10.5. 3 10.6. 1 10.7. 2 10.8. $\frac{2}{3}$ 10.9. -4 10.10. $\frac{-1}{4}$ 10.11. 1 10.12. $\frac{-4}{3}$
10.13. $\frac{1}{4}$ 10.14. $\frac{1}{3}$ 10.15. $\frac{1}{2}$ 10.16. -1 10.17. -1 10.18. $\frac{1}{3}$ 10.19. $\frac{1}{4}$ 10.20. -4 10.21. -1 10.22. 3 10.23. $\frac{-1}{3}$ 10.24. -1 11.1. s.s.r. 11.2. s.s.r.
11.3. s.s.r. 11.4. s.s.r. 11.5. s.s.r. 11.6. s.s.r. 11.7. s.s.r. 11.8. s.s.r. 11.9. s.s.r. 11.10. s.s.r. 11.11. s.s.r. 11.12. s.s.r. 12.1. s.s.r. 12.2. s.s.r. 12.3. s.s.r.
12.4. s.s.r. 12.5. s.s.r. 12.6. s.s.r. 12.7. s.s.r. 12.8. s.s.r. 12.9. s.s.r. 12.10. s.s.r. 12.11. s.s.r. 12.12. s.s.r. 13.1. $\pm \frac{1}{3}$ 13.2. ± 3 13.3. ± 1 13.4. $\pm \frac{2}{3}$
13.5. ± 2 13.6. ± 2 13.7. $\pm \frac{2}{3}$ 13.8. ± 1 13.9. $\pm \frac{3}{2}$ 13.10. ± 1 13.11. ± 1 13.12. ± 1 13.13. $\pm \frac{2}{3}$ 13.14. ± 3 13.15. ± 2 13.16. ± 1 13.17. ± 4 13.18. ± 1

13.19. $\pm \frac{3}{2}$ **13.20.** $\pm \frac{3}{2}$ **13.21.** $\pm \frac{1}{2}$ **13.22.** ± 3 **13.23.** $\pm \frac{1}{4}$ **13.24.** $\pm \frac{2}{3}$ **14.1.** $0, \frac{1}{2}$ **14.2.** $\frac{-1}{3}, 0$ **14.3.** $0, \frac{1}{2}$ **14.4.** $0, 1$ **14.5.** $\frac{-1}{2}, 0$ **14.6.** $-2, 0$ **14.7.** $0, \frac{1}{2}$
14.8. $-1, 0$ **14.9.** $\frac{-2}{3}, 0$ **14.10.** $\frac{-1}{4}, 0$ **14.11.** $0, 1$ **14.12.** $0, 1$ **14.13.** $0, \frac{1}{4}$ **14.14.** $0, 3$ **14.15.** $-2, 0$ **14.16.** $0, \frac{3}{4}$ **14.17.** $\frac{-1}{4}, 0$ **14.18.** $0, 1$ **14.19.** $0, \frac{1}{2}$
14.20. $\frac{-2}{3}, 0$ **14.21.** $0, 1$ **14.22.** $0, 2$ **14.23.** $-4, 0$ **14.24.** $0, 1$ **15.1.** $\frac{1}{4}, 3$ **15.2.** $-3, 2$ **15.3.** $\frac{-4}{3}, \frac{1}{4}$ **15.4.** $\frac{-3}{4}, 3$ **15.5.** $\frac{-3}{2}, \frac{-3}{4}$ **15.6.** $1, \frac{4}{3}$ **15.7.** $\frac{-1}{4}, \frac{4}{3}$
15.8. $\frac{-1}{4}, \frac{3}{4}$ **15.9.** $-1, \frac{1}{2}$ **15.10.** $-1, \frac{1}{2}$ **15.11.** $-2, \frac{-4}{3}$ **15.12.** $-2, \frac{-1}{4}$ **15.13.** $-1, \frac{1}{3}$ **15.14.** $-1, \frac{-1}{3}$ **15.15.** $\frac{-3}{2}, \frac{-1}{2}$ **15.16.** $\frac{-3}{4}, \frac{1}{3}$ **15.17.** $\frac{-2}{3}, \frac{-1}{2}$ **15.18.** $-3, \frac{1}{2}$
15.19. $-1, 3$ **15.20.** $-4, 3$ **15.21.** $-2, \frac{-2}{3}$ **15.22.** $\frac{-3}{2}, \frac{-1}{4}$ **15.23.** $-4, -3$ **15.24.** $-1, \frac{-3}{4}$ **15.25.** $\frac{-1}{2}, \frac{2}{3}$ **15.26.** $1, 4$ **15.27.** $-2, \frac{-1}{2}$ **15.28.** $2, 4$ **15.29.** $-3, -1$
15.30. $\frac{3}{4}, 1$ **15.31.** $\frac{-3}{4}, \frac{-1}{4}$ **15.32.** $-3, \frac{-4}{3}$ **15.33.** $-4, 2$ **15.34.** $-1, 2$ **15.35.** $-2, \frac{2}{3}$ **15.36.** $\frac{-4}{3}, 1$ **15.37.** $\frac{3}{2}, 4$ **15.38.** $\frac{1}{4}, 1$ **15.39.** $\frac{-1}{2}, 2$ **15.40.** $-4, -2$ **15.41.**
 $-4, \frac{-1}{2}$ **15.42.** $-2, \frac{-1}{4}$ **16.1.** $\frac{-1}{3}$ **16.2.** $\frac{1}{2}$ **16.3.** -1 **16.4.** 2 **16.5.** 1 **16.6.** -2 **16.7.** -2 **16.8.** $\frac{2}{3}$ **16.9.** 1 **16.10.** $\frac{1}{3}$ **16.11.** 2 **16.12.** $\frac{-1}{4}$ **16.13.** 4 **16.14.**
 $\frac{3}{4}$ **16.15.** $\frac{-3}{2}$ **16.16.** $\frac{-3}{2}$ **16.17.** 2 **16.18.** -1 **16.19.** 2 **16.20.** $\frac{-1}{2}$ **16.21.** -1 **16.22.** 1 **16.23.** $\frac{-2}{3}$ **16.24.** $\frac{-4}{3}$ **17.1.** inc **17.2.** 3 **17.3.** inc **17.4.** 1 **17.5.**
 $\frac{-1}{3}$ **17.6.** $\frac{1}{3}$ **17.7.** $\frac{1}{2}$ **17.8.** $\frac{-2}{3}$ **17.9.** -1 **17.10.** -3 **17.11.** -2 **17.12.** -1 **17.13.** inc **17.14.** inc **17.15.** -1 **17.16.** 3 **17.17.** $\frac{-2}{3}$ **17.18.** $\frac{2}{3}$ **17.19.** $\frac{-1}{3}$
17.20. $\frac{1}{3}$ **17.21.** -2 **17.22.** -1 **17.23.** -1 **17.24.** $\frac{2}{3}$ **18.1.** s.s.r. **18.2.** s.s.r. **18.3.** s.s.r. **18.4.** s.s.r. **18.5.** s.s.r. **18.6.** s.s.r. **18.7.** s.s.r. **18.8.** s.s.r.
18.9. s.s.r. **18.10.** s.s.r. **18.11.** s.s.r. **18.12.** s.s.r. **19.1.** s.s.r. **19.2.** s.s.r. **19.3.** s.s.r. **19.4.** s.s.r. **19.5.** s.s.r. **19.6.** s.s.r. **19.7.** s.s.r. **19.8.** s.s.r. **19.9.**
s.s.r. **19.10.** s.s.r. **19.11.** s.s.r. **19.12.** s.s.r.