

1. Resuelve la ecuación:

[4 sol.]

- $x+3-5x^2+1 = x-x^4$
- $x^4-3x^2+1 = 2x^2-3$
- $x^3-x^3(x+1) = 4-5x^2$
- $3x-2-3x = 2+x^4-5x^2$
- $3x^2+2+4x^4 = 40x^2-7$
- $x^4-9 = 2(x^4+x^2)-12x^2$
- $3(x-3)-x^4-3x = 7-17x^2$
- $15x^2-9x^4-4 = x+2x^2-x$
- $154x^2-2-79 = x^2+16x^4$
- $2x-x^4-2x = 2-13x^2+34$
- $37x^2-3-2x = 4x^4-2x+6$
- $3(x+2)-x^4+5x^2-10 = 3x$
- $3x-x^4-3x-143 = 1-25x^2$
- $3x-5x^2+10 = 3(x+2)-x^4$
- $68x^2-7x^4 = 16-3x(x^3-x)$
- $59x^2-3(x^4-2x^2)-16 = x^4$
- $x^3-x^4-x^3+19x^2 = 2x^2+16$
- $8x^2-x^4-4 = 3(x^2-2x)+6x$
- $6x-3(2x-2)-15 = x^4-10x^2$
- $5x^2-4x^3 = 2x^2(2x^2-2x)+1$
- $20x^2-3(x^2-x)-3x-16 = x^4$
- $3x^3(x-3)+x^4+9x^3+1 = 5x^2$
- $3(x+2)+16x^4+3 = 25x^2+3x$
- $20x^2-64 = x^2(x^2+2x)-2x^3$

2. Resuelve la ecuación:

[2 sol. A]

- $3x-x^4-3x = 1-2x^2$
- $x^4-2x+1 = x(x-2)+x^2$
- $8x^2-2x^3 = x^3(x-2)+16$
- $x^4+3x^3-2x^2+1 = 3x^3$
- $2x^2-x^4-3x = 7-3(x+2)$
- $1-16x^4-2 = 2x-8x^2-2x$
- $30x^2-x^2(x^2-2)-256 = 0$
- $18x^2-3-2x+2+2x = 81x^4$
- $x^3-x^2(x+3)-x^4 = 16-11x^2$
- $3(3x+1)-8x^2-2 = 9x-16x^4$
- $x^3-8x^2+16 = x^4-x^3(2x-1)$
- $81x^4-72x^2+3x+13 = 3x-3$
- $16x^4-3x(x+1)+3x = 5x^2-1$
- $3(3x^2+3x)-x^2-9x = x^4+16$
- $18x^2+4x-87 = 2(2x-3)+x^4$
- $9x^2-x^4-16 = 2x^3-x^2(2x-1)$
- $x(3x+1)-x+81 = 75x^2-16x^4$
- $x^3(x-2)+2x^3-1 = 17x^4-8x^2$
- $9x^3+x^2+16 = 3x^2(3x+3)-x^4$
- $3x^3-x^4-x^2(3x-2) = 16-6x^2$
- $x^3-81x^4+71x^2 = x^2(x-1)+16$
- $x^4-2(3x+3)+6x = 32x^2-262$
- $32x^2-x(x^3-3x^2) = 3x^3+256$
- $3x^2(2x-3)+16x^4+1 = 6x^3-x^2$

3. Resuelve la ecuación:

[2 sol. B]

- $x^3(x-3)+3x^3 = 1$
- $3x^3+4 = 3x(x^2-x)+x^4$
- $x^2(x+1)-x^3-8x^2+16 = 9x^4$
- $2x^3(x-1)-3x^4+2x^3+81 = 0$
- $9-10x^4 = 3x^2(2x^2-1)-4x^2$
- $4-6x^3-x^4 = x^2-2x^2(3x+2)$
- $x^4-3(3x+2)-12x^2 = 58-9x$
- $13x^2-2x+2x+4 = 4x^4-2x^2$
- $3x^4-x(2x^3-3x)-64 = 15x^2$
- $256-5x^4 = 2x^3-2x^3(2x+1)$
- $3(2x^2-x)-11x^2+3x = 36-x^4$
- $x^4-3x^3+36 = x^3(2x-3)-5x^2$

4. Resuelve la ecuación:

[Sin sol. A]

- $x^4-3x+1 = 3x(x-1)-5x^2$
- $1-81x^4 = 22x^2-2(2x^2-1)$
- $8x^2+2x+18 = 2(x+1)-x^4$
- $9x-18x^2-x^4 = 3(3x+1)+78$
- $2(3x^4-2x^2)-4x^2 = 22x^4+1$
- $-x^2(x^2+3)-69x^2 = 80x^4+16$
- $3x(x^3+2x)-38x^2 = 259x^4+1$
- $x^4+35x^2-2x+256 = x(3x-2)$
- $x^3(3x-3)-4x^4-8x^2 = 16-3x^3$
- $3x^2(2x-3)-6x^3+x^2 = 16x^4+1$
- $x^4-2x^3-81 = x^3(2x-2)+18x^2$
- $2(x+3)-72x^2-2x-22 = 81x^4$

5. Resuelve la ecuación:

[Sin sol. B]

- $9x-5x^2-3(3x+1)-1 = x^4$
- $3(2x^2+1)-16x^4 = 71x^2+7$
- $x^4-13x^2 = 2x(x^3+2x)+16$
- $9x-x^4-10x^2 = 3(3x-2)+15$
- $x^4+25x^2+3x = 3(x+1)-147$
- $-3x^2(x^2+3)-4 = 6x^4+28x^2$
- $-3x^2(x^2+2)-13x^4-9 = 19x^2$
- $x^3-9x^4-23x^2 = x^2(x+2)+16$
- $8x^4+85x^2+36 = x^3-x^3(x+1)$
- $10x^4-x^2(x^2-x)+10x^2 = x^3-1$
- $2x(3x-3)-26x^2+6x = x^4+64$
- $2x^3-x^2(2x-2)-x^4-36 = 15x^2$

6. Resuelve la ecuación:

[4 sol.]

- $\frac{19x^4+26}{30} - x^4 = 3 - \frac{x^4+2x^2}{3}$
- $\frac{7x^4+8x^3+17x^2}{16} - \frac{x^4+x^3}{2} = 1$
- $\frac{2x^4+x^2}{2} - x^4 = x^2 - \frac{x^4+2x^2+9}{24}$
- $2x^4 - \frac{x^2(x^2-3)}{2} = 4x^2 - \frac{5x^2+1}{6}$
- $\frac{x^2(3x^2+101)}{24} - \frac{x^2(3x^2+1)}{6} = 6$
- $\frac{x^4+4x^3-145x^2}{8} + \frac{2x^4-x^3}{2} = -2$
- $\frac{4x^3-41x^2}{8} + 1 = \frac{x^3-x^4}{2} - \frac{x^4-7}{16}$
- $x^2 - \frac{5x^4+11x^2+4}{20} - \frac{x^2(1-x^2)}{5} = 0$
- $2x^2 - \frac{2x^3+3x^2-11}{20} - 1 = \frac{x^3(2x-1)}{10}$
- $x^4 - \frac{2x^3-1}{4} - \frac{4x^4+17x^2}{16} = \frac{x^4-x^3}{2}$
- $x^2 - \frac{x^3(3x-1)}{10} - \frac{3x^3+5x^2-14}{30} = 1$
- $\frac{x^2(2x^2-1)}{2} - \frac{9-41x^2-4x^4}{8} = 2x^4$
- $x^4 - \frac{x^3(x-2)}{2} - \frac{10x^4-5x^2+4}{18} = x^3$
- $x^4 - \frac{x^2(2x^2-3)}{2} - \frac{x^4+10x^2-2}{18} = 1$
- $x^4 - \frac{x^3(3x-1)}{2} - \frac{9x^3-40x^2-2}{18} = 1$
- $\frac{x^3+1}{2} - \frac{x^4-3x^3}{6} - x^3 = x^2 - \frac{7x^4+5x^2}{18}$
- $x^4 - \frac{x^4+85x^2}{20} - \frac{x^4+x^3}{2} = \frac{2-5x^3}{10} - 2$
- $\frac{3x^3+4}{6} - \frac{x^3(x+1)}{2} = x^2 - \frac{x^2(13x^2+7)}{24}$
- $2x^4 - \frac{x^2(3x^2-1)}{3} - \frac{11x^4-x^2-1}{27} = x^2$
- $x^2 - \frac{2(5x^2+2)}{27} - \frac{x^3(x+3)}{9} = \frac{x^3(x-9)}{27}$
- $x^4 - \frac{2(4x^4+137x^2-72)}{27} = \frac{x^2(x^2-3)}{9}$

$$22. 2x^4 + \frac{x^3+2}{4} - \frac{x^2(x^2+37)}{8} = \frac{x^3(3x+1)}{4}$$

$$23. \frac{x^3(x+2)}{4} - x^4 = x^3 - \frac{x^2(2x+1)}{4} - \frac{11x^4-1}{20}$$

$$24. \frac{x^3(2x+1)}{4} - \frac{7x^4-9}{16} - \frac{x^2(2x-3)}{8} = x^2$$

7. Resuelve la ecuación:

[2 sol. A]

$$1. x^2 - \frac{83x^4-6x+1}{18} = \frac{3x-x^4}{9}$$

$$2. \frac{x^2(3x^2-2)}{5} - \frac{2x^4-81}{30} = 2x^2$$

$$3. \frac{x^2(x^2-2)}{5} - \frac{85x^4-4}{20} = -4x^2+1$$

$$4. \frac{x^3(3x+2)}{2} - \frac{8x^4-81}{6} = x^3+3x^2$$

$$5. \frac{x^3(x+3)}{3} - \frac{10x^4-2x^2+1}{27} = x^3$$

$$6. x^2 - \frac{2x^4-3x}{2} - \frac{8x^2-8x+1}{16} = 2x$$

$$7. x^3 - \frac{5x^4-8x^2+16}{6} = \frac{3x^3-2x^4}{3}$$

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

$$9. \frac{x^2(2x^2-3)}{15} - \frac{20x^4-78x^2-9}{30} = 3$$

$$10. 17x^4 - \frac{2x^4-x^3}{2} - \frac{8x^3-81}{16} = 18x^2$$

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

$$12. \frac{x^3(2-x)}{2} - \frac{x^2(73x^2-72)}{16} = x^3+1$$

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

$$14. 18x^4 - \frac{8x^4+8x^2-1}{16} = \frac{3x^2(x^2+1)}{2}$$

$$15. \frac{x^2(1-2x^2)}{2} - \frac{57x^4-276x^2-8}{24} = 11$$

$$16. 3x^4 - \frac{2x^4+20x^2-1}{12} = \frac{x^2(3x^2-2)}{2}$$

$$17. 4x^2 - \frac{63x^4+9x^3-2}{18} - \frac{x^3(2x-1)}{2} = 1$$

$$18. 1 - \frac{4x^2+1}{9} - \frac{x^3(11x-6)}{18} = \frac{x^3(1-2x)}{3}$$

$$19. 12x^2 - \frac{250x^4-9x^3+81}{24} = \frac{x^3(2x+3)}{8}$$

$$20. \frac{x^2(1-5x)}{10} - \frac{x^3(3x-2)}{4} = x^2 - \frac{16x^4+81}{20}$$

$$21. \frac{x^3(x-2)}{4} - \frac{3x^4-3x^3-128}{6} = -7x^4+24x^2$$

$$22. x^4 - \frac{x^3(x-27)}{18} - \frac{x^3(2x+3)}{2} = \frac{16(8-x^2)}{9}$$

$$23. \frac{x^3(x+2)}{5} - \frac{8x^4-81}{20} + x^4 = 4x^2 - \frac{2x^2(1-x)}{5}$$

$$24. \frac{x^2(2x+9)}{8} - \frac{x^3(2x-3)}{4} = 5x^4+x^3 - \frac{7x^4-1}{16}$$

8. Resuelve la ecuación:

[2 sol. B]

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

$$2. 22x^2 - \frac{7x^4-81}{6} = \frac{x^2(3x^2-1)}{2}$$

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

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

$$5. x^4 - \frac{2x^4-x^3}{4} - \frac{11x^4+6x^3-15}{24} = 4$$

$$6. x^4 - \frac{x^4-9x^2-1}{27} - \frac{x^2(3x^2-2)}{3} = x^2$$

$$7. 16x^2 - \frac{5x^4-4x^3-256}{8} = \frac{x^3(x+1)}{2}$$

$$8. x^2+43 - \frac{7x^4+4x^2+2}{6} = \frac{x^2(1-3x^2)}{3}$$

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

$$10. \frac{2x^4-x^3}{4} - \frac{7x^4-7}{16} - x^2 = 1 - \frac{x^3+2x^2}{4}$$

$$11. \frac{2-5x}{10} - \frac{2x^4-x}{2} - x^2 = 1 - \frac{21x^4+5x^2}{20}$$

$$12. \frac{3x^4-2x^3}{9} - \frac{10x^4-64}{27} = x^2 - \frac{2x^3+5x^2}{9}$$

9. Resuelve la ecuación:

[Sin sol. A]

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

$$2. \frac{x^2(x^2-3)}{5} - \frac{5x^4-4}{20} = x^2+13$$

$$3. x^2 - \frac{2x^3(1-x)}{9} - \frac{3x^4-4x^3-81}{18}$$

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

$$5. \frac{x^2(x^2-2)}{9} - \frac{2x^4-14x^2+11}{27} + 1 = 0$$

$$6. \frac{2x^3-3x^4}{2} = x^3 - \frac{274x^4+32x^2+1}{12}$$

$$7. \frac{x^3(3-x)}{3} - \frac{82x^4+96x^2+27}{10} = x^3$$

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

$$9. \frac{x^3(2-3x)}{2} - x^3 = 4x^4 - \frac{7x^4-18x^2-1}{16}$$

$$10. \frac{3x^3(x-1)}{4} - \frac{81-6x^3-2x^4}{8} = 3x^4+9x^2$$

$$11. 7 - \frac{4x^4-292x^2+3}{12} = \frac{x^2(x^2+1)}{3} - 22x^4$$

$$12. \frac{2x^3-3x^4}{5} - 8x^4 = 2 - \frac{2-36x^2}{5} - \frac{5x^4-4x^3}{10}$$

10. Resuelve la ecuación:

[Sin sol. B]

$$1. x^3 - \frac{12x^3-5x^2-1}{20} = \frac{2x^3-x^4}{5}$$

$$2. \frac{3x^4+x^2}{3} - \frac{14x^4-59x^2+2}{18} + 1 = 0$$

$$3. \frac{x^3-2x^4}{3} - x^3 = 6 - \frac{4x^3-25x^2}{6}$$

$$4. x - \frac{x(2x^3+1)}{3} - \frac{37x^2+4x-3}{6} = 2$$

$$5. \frac{x^2(2-x^2)}{9} - \frac{6x^4-11x^2+16}{27} = 6x^2$$

$$6. x^4 - \frac{x^2(3x^2-2)}{4} - \frac{3x^2(x^2+7)}{8} = 2$$

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

$$8. \frac{x^3(3x-2)}{8} - \frac{x^2(15x^2-4x+52)}{16} = 4$$

$$9. \frac{x^2-x^3}{6} - \frac{x^4-21}{30} = x^2+1 + \frac{3x^4-x^3}{6}$$

$$10. \frac{x^4+x^3}{6} - \frac{4x^4+3x^3-11x^2}{18} - 2x^2 = 8$$

$$11. 1 - \frac{x^2(2x^2+3)}{6} - \frac{3x^4-91x^2+9}{18} = -x^4$$

$$12. x^4 - \frac{3x^4+4x^3-20x^2}{16} = \frac{3x^4-x^3}{4} - 4$$

11. Resuelve la ecuación:

[4 sol.]

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

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

$$3. \frac{9}{x+2} - \frac{9}{x-2} = -x^2+13$$

$$4. \frac{1}{x-3} - \frac{x+43}{x^2-9} = x^2+4$$

$$5. x^2 - \frac{1}{x+2} = 6 - \frac{x-17}{x^2-4}$$

$$6. 65 + \frac{1}{x} - \frac{x+4}{x^2} = 16x^2$$

$$7. \frac{5}{6x+9} - \frac{5}{6x-9} = x^2+1$$

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

$$9. 12 + \frac{1}{x+1} - \frac{x+23}{x^2-1} = x^2$$

$$10. 4x^2 - \frac{1}{x+1} - \frac{46-x}{x^2-1} = 61$$

$$11. x^2+x - \frac{13}{x-1} = 12 - \frac{x+36}{x^2-x}$$

$$12. 4x^2 - \frac{45}{2x-2} = 61 - \frac{45}{2x+2}$$

$$13. 4x^2 - \frac{24}{x-1} - \frac{9}{x} + 4x = 33$$

$$14. 6 - \frac{9}{2x} - \frac{15}{2x+4} = x^2-2x$$

$$15. \frac{1}{4x+6} - \frac{2x+17}{8x^2-18} - x^2 = 1$$

$$16. \frac{11}{x} - 2x+x^2 = 6 - \frac{x-13}{x^2+2x}$$

$$17. 2x - \frac{11}{x+2} - \frac{x+9}{x^2+2x} = x^2-6$$

$$18. 31-9x - \frac{x-16}{x^2-x} = 9x^2 - \frac{32}{x}$$

$$19. 2x^2+x - \frac{7}{2x-1} = 6 - \frac{x+9}{2x^2-x}$$

$$20. \frac{1}{9x-3} - \frac{3x+25}{27x^2-3} = 3x^2-4$$

$$21. 12-x + \frac{25}{2x} - \frac{x+47}{2x^2-2x} = x^2$$

$$22. -x^2-3x - \frac{11}{x-3} - \frac{x+4}{x^2-3x} = 4$$

$$23. 11 - \frac{16}{x} - \frac{x-16}{2x^2+3x} = 4x^2-6x$$

$$24. 36x^2 - \frac{1}{4x-2} = 31 - \frac{2x-29}{8x^2-2}$$

12. Resuelve la ecuación:

[2 sol. A]

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

$$2. \frac{32}{x-1} - \frac{32}{x+1} = -x^2+17$$

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

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

$$5. \frac{16}{x} - \frac{9}{x+1} - x+x^2 = 7$$

$$6. 14 + \frac{1}{x-2} - \frac{x+27}{x^2-4} = x^2$$

$$7. 4x^2 - \frac{1}{4} = 14 - \frac{x^2+24}{4x^2-4}$$

$$8. 4x^2 - \frac{1}{4} = 7 - \frac{4x^2+35}{16x^2-4}$$

$$9. \frac{1}{x-1} - \frac{4x+13}{4x^2-4} - 4x^2 = 2$$

$$10. \frac{1}{x+2} - \frac{x+47}{x^2-4} = 16x^2-8$$

$$11. -x^2-3x - \frac{2}{x} - \frac{x+22}{x^2-3x} = 1$$

$$12. \frac{1}{x+1} - \frac{x+24}{x^2-1} - 81x^2 = 9$$

$$13. \frac{1}{4x+6} - \frac{2x+47}{8x^2-18} - 4x^2 = 1$$

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

$$15. 14 + \frac{1}{4x-4} - \frac{x+26}{4x^2-4} = 4x^2$$

$$16. \frac{1}{3x+3} - \frac{x+24}{3x^2-3} - 27x^2 = 3$$

$$17. \frac{22}{x+3} - \frac{x+1}{x^2+3x} - x^2+3x = 7$$

$$18. \frac{1}{9x-6} - \frac{3x+29}{27x^2-12} - 9x^2 = 2$$

$$19. \frac{1}{2x} - 18x+6 = \frac{27}{6x+4} - 27x^2$$

$$20. \frac{1}{6x} - \frac{25x+2}{6x^2-6x} - 8x^2-8x = 4$$

$$21. \frac{1}{4x+2} - \frac{2x+49}{8x^2-2} - 324x^2 = 9$$

$$22. \frac{16}{3x} - \frac{25}{3x-3} - 27x^2-27x = 3$$

$$23. 1 - \frac{5}{4x} - \frac{2x-47}{8x^2+12x} = -4x^2+6x$$

$$24. \frac{1}{2x} - \frac{27}{6x-4} - 27x^2-18x = 6$$

13. Resuelve la ecuación:

[2 sol. B]

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

$$2. \frac{40}{x+1} - \frac{40}{x-1} = -9x^2+71$$

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

$$4. \frac{39}{2x+2} - \frac{39}{2x-2} + 4x^2 = 3$$

$$5. 15 + \frac{1}{2x} - \frac{x-32}{2x^2} = x^2$$

$$6. \frac{1}{x+1} - \frac{x+38}{x^2-1} - 48 = 16x^2$$

$$7. -x^2-2x - \frac{9}{2x} - \frac{39}{2x-4} = 12$$

$$8. \frac{1}{9x+3} - \frac{3x-46}{27x^2-3} - 9x^2 = 1$$

$$9. -\frac{1}{2x} - \frac{15}{2x-2} - 8x^2-8x = 8$$

$$10. \frac{9}{x} - \frac{x+14}{3x^2+2x} - 3x^2+2x = 13$$

$$11. \frac{1}{4x+2} - \frac{2x+49}{8x^2-2} - 18x^2 = 43$$

$$12. \frac{33}{2x^2-2} - \frac{1}{4x^2-4} - 4x^2-4 = 0$$

14. Resuelve la ecuación:

[Sol. falsas]

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

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

$$3. 9 - \frac{x+18}{2x^2-2x} = x^2+x - \frac{19}{2x-2}$$

$$4. \frac{49}{3x-3} - \frac{x+48}{3x^2-3x} - x^2+16 = x$$

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

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

$$7. 36 + \frac{37}{4x-1} - \frac{x+9}{4x^2-x} = 4x^2+x$$

$$8. 32 - \frac{31}{2x+1} - \frac{x+16}{2x^2+x} = 2x^2-x$$

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

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

$$11. 4 - \frac{x+16}{x^2+2x} - \frac{7}{x+2} = x^2-2x$$

$$12. 4-x^2 + \frac{9}{x-2} - \frac{x+16}{x^2-2x} = 2x$$

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

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

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

$$16. \frac{7}{6x-3} - \frac{x+3}{6x^2-3x} = 8x^2+4x-2$$

$$17. \frac{2}{3x-1} - \frac{3x-1}{9x^2+3x} - 3x+9x^2 = 1 \quad 18. \frac{2}{x+1} - \frac{x-1}{x^2+x} - x^2+x = 1 \quad 19. \frac{x+1}{x^2-x} - 4x^2-4x = \frac{2}{x-1} + 1 \quad 20. \frac{3}{x+2} - \frac{x-4}{x^2+2x} - x^2+2x = 1$$

$$21. -\frac{2}{x-3} - 3x-1 - \frac{x-9}{x^2-3x} = x^2 \quad 22. \frac{16-x}{x^2-4x} - \frac{3}{x-4} - 4x-1 = x^2 \quad 23. \frac{4-x}{x^2-2x} - 4x^2-8x-1 = \frac{1}{x-2} \quad 24. \frac{3}{2x+1} - \frac{x-1}{2x^2+x} - 2x^2+x = 2$$

15. Resuelve la ecuación:

[Sin sol. A]

$$1. \frac{1}{x+1} - \frac{x+3}{x^2-1} - x^2 = 3 \quad 2. \frac{1}{9x-9} - \frac{x+37}{9x^2-9} = x^2+3 \quad 3. \frac{25}{2x+2} - \frac{25}{2x-2} = x^2+9 \quad 4. \frac{1}{9} - \frac{x^2+35}{9x^2-9} - x^2-3 = 0$$

$$5. 4x^2+6 = \frac{1}{x+1} - \frac{4x+21}{4x^2-4} \quad 6. \frac{5(2x-3)}{x^2+x} - \frac{1}{x} - x^2+x = 9 \quad 7. \frac{1}{6x^2} - \frac{1}{2x^2} - 27x^2-6 = 0 \quad 8. \frac{1}{3x} - \frac{2(5x-1)}{3x^2+3x} = -x^2+x-3$$

$$9. 8x^2 - \frac{25}{2x+2} + \frac{1}{2x} = 8x-12 \quad 10. -x-3 - \frac{x+7}{2x^2+2x} - \frac{5}{2x} = x^2 \quad 11. \frac{2}{x} - \frac{2x+5}{4x^2+2x} - 4x^2+2x = 3 \quad 12. 5 + \frac{1}{x+1} - \frac{9x+5}{x^2+2x+1} = 2x-x^2$$

16. Resuelve la ecuación:

[Sin sol. B]

$$1. \frac{1}{2} - \frac{x^2+32}{2x^2} - x^2-17 = 0 \quad 2. \frac{1}{x+1} - \frac{x+9}{x^2-1} = x^2+6 \quad 3. \frac{1}{x+2} - \frac{x+38}{x^2-4} - x^2-9 = 0 \quad 4. \frac{19}{x} - \frac{x+35}{x^2+x} - x^2+x = 18$$

$$5. \frac{15}{x+1} - \frac{x+36}{x^2+x} - x^2+x = 14 \quad 6. \frac{1}{4} - \frac{4x^2+19}{16x^2-4} - 2x^2-3 = 0 \quad 7. 3x-x^2 - \frac{x+4}{x^2+3x} = 14 - \frac{43}{x+3} \quad 8. -\frac{5}{4x} - x-3 - \frac{2x+9}{8x^2-4x} = 2x^2$$

$$9. \frac{1}{4} - \frac{x^2-23x+16}{4x^2+4x} - x^2+x = 6 \quad 10. \frac{1}{4x-2} - \frac{2x+35}{8x^2-2} - 2x^2-9 = 0 \quad 11. -\frac{17}{x-2} - \frac{x+4}{x^2-2x} - x^2-2x = 9 \quad 12. \frac{37}{2x+2} - \frac{x+32}{2x^2+2x} - x^2+x = 18$$

— Soluciones —

1.1. $\pm 2, \pm 1$ 1.2. $\pm 2, \pm 1$ 1.3. $\pm 2, \pm 1$ 1.4. $\pm 2, \pm 1$ 1.5. $\pm 3, \pm \frac{1}{2}$ 1.6. $\pm 3, \pm 1$ 1.7. $\pm 4, \pm 1$ 1.8. $\pm 1, \pm \frac{2}{3}$ 1.9. $\pm 3, \pm \frac{3}{4}$ 1.10. $\pm 3, \pm 2$ 1.11. $\pm 3, \pm \frac{1}{2}$ 1.12. $\pm 2, \pm 1$ 1.13. $\pm 4, \pm 3$ 1.14. $\pm 2, \pm 1$ 1.15. $\pm 4, \pm \frac{1}{2}$ 1.16. $\pm 4, \pm \frac{1}{2}$ 1.17. $\pm 4, \pm 1$ 1.18. $\pm 2, \pm 1$ 1.19. $\pm 3, \pm 1$ 1.20. $\pm 1, \pm \frac{1}{2}$ 1.21. $\pm 1, \pm 4$ 1.22. $\pm 1, \pm \frac{1}{2}$ 1.23. $\pm \frac{3}{4}, \pm 1$ 1.24. $\pm 4, \pm 2$ 2.1. ± 1 2.2. ± 1 2.3. ± 2 2.4. ± 1 2.5. ± 1 2.6. $\pm \frac{1}{2}$ 2.7. ± 4 2.8. $\pm \frac{1}{3}$ 2.9. ± 2 2.10. $\pm \frac{1}{2}$ 2.11. ± 2 2.12. $\pm \frac{2}{3}$ 2.13. $\pm \frac{1}{2}$ 2.14. ± 2 2.15. ± 3 2.16. ± 2 2.17. $\pm \frac{3}{2}$ 2.18. $\pm \frac{1}{2}$ 2.19. ± 2 2.20. ± 2 2.21. $\pm \frac{2}{3}$ 2.22. ± 4 2.23. ± 4 2.24. $\pm \frac{1}{2}$ 3.1. ± 1 3.2. ± 2 3.3. ± 1 3.4. ± 3 3.5. ± 1 3.6. ± 2 3.7. ± 4 3.8. ± 2 3.9. ± 4 3.10. ± 4 3.11. ± 3 3.12. ± 3 4.1. s.s.r. 4.2. s.s.r. 4.3. s.s.r. 4.4. s.s.r. 4.5. s.s.r. 4.6. s.s.r. 4.7. s.s.r. 4.8. s.s.r. 4.9. s.s.r. 4.10. s.s.r. 4.11. s.s.r. 4.12. s.s.r. 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. $\pm 4, \pm 2$ 6.2. $\pm 4, \pm 1$ 6.3. $\pm 3, \pm 1$ 6.4. $\pm 1, \pm \frac{1}{3}$ 6.5. $\pm 3, \pm \frac{4}{3}$ 6.6. $\pm 4, \pm \frac{1}{3}$ 6.7. $\pm 3, \pm \frac{1}{3}$ 6.8. $\pm 2, \pm 1$ 6.9. $\pm 3, \pm \frac{1}{2}$ 6.10. $\pm 2, \pm \frac{1}{2}$ 6.11. $\pm \frac{4}{3}, \pm 1$ 6.12. $\pm 3, \pm \frac{1}{2}$ 6.13. $\pm 2, \pm 1$ 6.14. $\pm 4, \pm 1$ 6.15. $\pm 2, \pm \frac{2}{3}$ 6.16. $\pm \frac{3}{2}, \pm 1$ 6.17. $\pm 3, \pm \frac{2}{3}$ 6.18. $\pm 4, \pm 1$ 6.19. $\pm 1, \pm \frac{1}{4}$ 6.20. $\pm 2, \pm \frac{1}{2}$ 6.21. $\pm 4, \pm \frac{3}{4}$ 6.22. $\pm 2, \pm \frac{1}{3}$ 6.23. $\pm 1, \pm \frac{1}{2}$ 6.24. $\pm 3, \pm 1$ 7.1. $\pm \frac{1}{3}$ 7.2. $\pm \frac{3}{2}$ 7.3. $\pm \frac{2}{3}$ 7.4. ± 3 7.5. ± 1 7.6. $\pm \frac{1}{2}$ 7.7. ± 2 7.8. ± 1 7.9. $\pm \frac{3}{2}$ 7.10. $\pm \frac{3}{4}$ 7.11. $\pm \frac{1}{2}$ 7.12. $\pm \frac{2}{3}$ 7.13. ± 2 7.14. $\pm \frac{1}{4}$ 7.15. $\pm \frac{4}{3}$ 7.16. $\pm \frac{1}{2}$ 7.17. $\pm \frac{2}{3}$ 7.18. ± 2 7.19. $\pm \frac{3}{4}$ 7.20. ± 3 7.21. $\pm \frac{4}{3}$ 7.22. ± 4 7.23. $\pm \frac{3}{2}$ 7.24. $\pm \frac{1}{3}$ 8.1. ± 2 8.2. ± 3 8.3. ± 2 8.4. ± 1 8.5. ± 3 8.6. ± 1 8.7. ± 4 8.8. ± 4 8.9. ± 1 8.10. ± 3 8.11. ± 4 8.12. ± 2 9.1. s.s.r. 9.2. s.s.r. 9.3. s.s.r. 9.4. s.s.r. 9.5. s.s.r. 9.6. s.s.r. 9.7. s.s.r. 9.8. s.s.r. 9.9. s.s.r. 9.10. s.s.r. 9.11. s.s.r. 9.12. s.s.r. 10.1. s.s.r. 10.2. s.s.r. 10.3. s.s.r. 10.4. s.s.r. 10.5. s.s.r. 10.6. s.s.r. 10.7. s.s.r. 10.8. s.s.r. 10.9. s.s.r. 10.10. s.s.r. 10.11. s.s.r. 10.12. s.s.r. 11.1. $\pm 2, \pm 1$ 11.2. $\pm 2, \pm 1$ 11.3. $\pm 4, \pm 1$ 11.4. $\pm 2, \pm 1$ 11.5. $\pm 3, \pm 1$ 11.6. $\pm 2, \pm \frac{1}{4}$ 11.7. $\pm 1, \pm \frac{1}{2}$ 11.8. $\pm \frac{3}{2}, \pm 1$ 11.9. $\pm 3, \pm 2$ 11.10. $\pm 4, \pm \frac{1}{2}$ 11.11. $\pm 3, \pm 2$ 11.12. $\pm 4, \pm \frac{1}{2}$ 11.13. $\pm 3, \pm \frac{1}{2}$ 11.14. $\pm 3, \pm 1$ 11.15. $\pm 1, \pm \frac{1}{2}$ 11.16. $\pm 3, \pm 1$ 11.17. $\pm 3, \pm 1$ 11.18. $\pm 2, \pm \frac{2}{3}$ 11.19. $\pm \frac{3}{2}, \pm 1$ 11.20. $\pm 1, \pm \frac{2}{3}$ 11.21. $\pm 3, \pm 2$ 11.22. $\pm 2, \pm 1$ 11.23. $\pm 2, \pm 1$ 11.24. $\pm 1, \pm \frac{1}{3}$ 12.1. ± 1 12.2. ± 3 12.3. ± 2 12.4. ± 2 12.5. ± 2 12.6. ± 3 12.7. $\pm \frac{3}{2}$ 12.8. ± 1 12.9. $\pm \frac{1}{2}$ 12.10. $\pm \frac{3}{2}$ 12.11. ± 2 12.12. $\pm \frac{2}{3}$ 12.13. ± 1 12.14. $\pm \frac{1}{2}$ 12.15. $\pm \frac{3}{2}$ 12.16. $\pm \frac{2}{3}$ 12.17. ± 1 12.18. $\pm \frac{1}{3}$ 12.19. $\pm \frac{1}{3}$ 12.20. $\pm \frac{1}{2}$ 12.21. $\pm \frac{1}{3}$ 12.22. $\pm \frac{2}{3}$ 12.23. $\pm \frac{2}{3}$ 12.24. $\pm \frac{1}{3}$ 13.1. ± 1 13.2. ± 3 13.3. ± 2 13.4. ± 2 13.5. ± 4 13.6. $\pm \frac{1}{2}$ 13.7. ± 1 13.8. $\pm \frac{2}{3}$ 13.9. $\pm \frac{1}{2}$ 13.10. $\pm \frac{1}{3}$ 13.11. $\pm \frac{1}{3}$ 13.12. $\pm \frac{3}{2}$ 14.1. $-2, -1, 2$ 14.2. $-2, -1, 1$ 14.3. $-3, -1, 3$ 14.4. $-4, -1, 4$ 14.5. $-\frac{1}{2}, \frac{1}{2}, 4$ 14.6. $-2, \frac{1}{3}, 2$ 14.7. $-3, -\frac{1}{4}, 3$ 14.8. $-4, \frac{1}{2}, 4$ 14.9. $-1, \frac{1}{3}, 1$ 14.10. 1 14.11. 2 14.12. -2 14.13. -1 14.14. $\frac{1}{2}$ 14.15. $-\frac{1}{3}$ 14.16. $-\frac{1}{2}$ 14.17. $\frac{1}{3}$ 14.18. 1 14.19. -1 14.20. 2 14.21. -3 14.22. -4 14.23. -2 14.24. $\frac{1}{2}$ 15.1. s.s.r. 15.2. s.s.r. 15.3. s.s.r. 15.4. s.s.r. 15.5. s.s.r. 15.6. s.s.r. 15.7. s.s.r. 15.8. s.s.r. 15.9. s.s.r. 15.10. s.s.r. 15.11. s.s.r. 15.12. s.s.r. 16.1. s.s.r. 16.2. s.s.r. 16.3. s.s.r. 16.4. s.s.r. 16.5. s.s.r. 16.6. s.s.r. 16.7. s.s.r. 16.8. s.s.r. 16.9. s.s.r. 16.10. s.s.r. 16.11. s.s.r. 16.12. s.s.r.