

1. Resuelve la ecuación:

[ $ax^2+c=0$ ]

- |                              |                               |                               |                               |
|------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 1. $1-x^2+3x = 3x$           | 2. $16x^2+x-2 = x-1$          | 3. $x^2+3x-6 = 3x-2$          | 4. $9x^2-3+3x+2 = 3x$         |
| 5. $4x^2-3(x^2+1)+2 = 0$     | 6. $x^2+9 = 2x(x+1)-2x$       | 7. $2x(x+2)-x^2-4 = 4x$       | 8. $15-4x^2 = 3(x+2)-3x$      |
| 9. $x(2x+2)-2x+1 = 3x^2$     | 10. $4x-9x^2-2(2x-3) = 5$     | 11. $3x^2+3x-4 = 3x+2x^2$     | 12. $4x-2(2x+3)+7 = 9x^2$     |
| 13. $1-3x = 3x(3x-1)-8x^2$   | 14. $9x-13x^2 = 3x(x+3)-9$    | 15. $9-2(x^2-3x)-2x^2 = 6x$   | 16. $2x-2x(3x+1) = 3x^2-4$    |
| 17. $3x(x+2)-2x^2-6x-4 = 0$  | 18. $5x^2-9x+1 = 3(2x^2-3x)$  | 19. $9-10x^2 = 3x(2x-3)+9x$   | 20. $7x^2-3x(2x-1)-3x-9 = 0$  |
| 21. $3x(x-1)+6x^2+3x-16 = 0$ | 22. $6x-12x^2 = 2(2x^2+3x)-1$ | 23. $3(3x^2-3x)+1 = 10x^2-9x$ | 24. $9-10x^2 = 3(2x^2-3x)+9x$ |

2. Resuelve la ecuación:

[ $ax^2+bx=0$ ]

- |                             |                              |                                |                                 |
|-----------------------------|------------------------------|--------------------------------|---------------------------------|
| 1. $2(2x^2+2x)-x^2 = 2x$    | 2. $2x^2-5x^2+4x = 3x$       | 3. $2(2x+1)-3x-2 = x^2$        | 4. $9-5x = 3x^2-3(x-3)$         |
| 5. $3(3x-2)-8x = x^2-6$     | 6. $3(x+1)-6x = 4x^2+3$      | 7. $6-x^2 = 7x-2(3x-3)$        | 8. $2(3x+2)-7x = x^2+4$         |
| 9. $3x(x+3)-10x = 4x^2$     | 10. $3x(x+3)-10x = 5x^2$     | 11. $5x^2-3x(3x-2) = 3x$       | 12. $2x(x-1)-3x^2+4x = 0$       |
| 13. $2x^2-2(2x^2-x)+x = 0$  | 14. $10x^2-9x = 3x(3x-2)$    | 15. $8x-3(2x+3)+9 = 3x^2$      | 16. $3x(3x+2)-10x^2 = 5x$       |
| 17. $4x-3(x-1)-4x^2-3 = 0$  | 18. $2(2x^2-3x)+7x = 3x^2$   | 19. $3(2x^2+2x)-5x^2 = 5x$     | 20. $2(x+3)+2x^2-5x-6 = 0$      |
| 21. $2x+3 = 3(3x^2+1)-8x^2$ | 22. $2(x+2)+11x = 3x(x+3)+4$ | 23. $2x(x-1)-x(x-2) = 2x^2+3x$ | 24. $5x^2-2x(3x-2)-7x = x(x-2)$ |

3. Resuelve la ecuación:

[Dos sol.]

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

4. Resuelve la ecuación:

[Sol. doble]

- |                              |                               |                               |                               |
|------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 1. $4x-2(3x+2)+3 = x^2$      | 2. $x(3x+3)-4x^2-5x = 1$      | 3. $x^2+2x-1 = 2(x^2+2x)$     | 4. $8-9x^2 = 3x-3(3x-3)$      |
| 5. $2(x+3)+6x-7 = 16x^2$     | 6. $2(3x-1)-x^2-14 = 14x$     | 7. $11x-x^2 = 3(3x-3)+10$     | 8. $2(3x-1)+2x+1 = 16x^2$     |
| 9. $x(3x+1)+x^2+3x+1 = 0$    | 10. $2x(2x-1)-8x^2+6x = 1$    | 11. $-2x-22 = 3(2x-2)+x^2$    | 12. $2(2x^2-x)-2x-4 = 5x^2$   |
| 13. $3x^2-2x(2x-2) = 6x+1$   | 14. $16x^2-15x+3 = 3(3x-2)$   | 15. $5x^2-2(3x^2+2x) = 1-2x$  | 16. $-2(x^2+3x)-2x^2 = 6x+9$  |
| 17. $3x(3x-1)-13x^2-x-1 = 0$ | 18. $2(x^2-x)-11x^2-22x = 16$ | 19. $10x-16 = 7x^2-2(3x^2-x)$ | 20. $15x-13x^2 = 9-3(3x^2-x)$ |
| 21. $12x^2-x(3x+1)+16 = 23x$ | 22. $-x(2x+2)-7x^2-16 = 22x$  | 23. $5x^2-3x(2x-3)-5x-4 = 0$  | 24. $20x-16x^2 = 15-2(2x+3)$  |

5. Resuelve la ecuación:

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

- |                              |                                |                               |                                  |
|------------------------------|--------------------------------|-------------------------------|----------------------------------|
| 1. $3x^2-4x+9 = 2x(x-2)$     | 2. $3(x^2-2x)-4x^2 = 1-6x$     | 3. $2x^2-3x(2x-3)-9x = 1$     | 4. $4x-8x^2 = 1-2x(2x-2)$        |
| 5. $2x(3x+2)-7x^2 = 4x+9$    | 6. $-3(3x^2-x)-7x^2 = 3x+9$    | 7. $2x(x+2)+2x^2-4x+1 = 0$    | 8. $4x^2-2(3x+1)+6x+3 = 0$       |
| 9. $2(2x^2-3x)+6x-4 = 13x^2$ | 10. $2(3x^2-2x)-7x^2+4x-1 = 0$ | 11. $3x(2x-1)+10x^2+3x+9 = 0$ | 12. $4x-17x^2-3(x-2) = 7-x(x-1)$ |

6. Resuelve la ecuación:

[Sin sol.]

1.  $4-x^2 = 4x-3(2x-2)$       2.  $2(3x-2)-x^2 = 8x+13$       3.  $3(3x+2)-11x-11 = x^2$       4.  $x(3x-3)+7x+5 = 2x^2$   
 5.  $5x^2-5 = 3(2x^2-1)+2x$       6.  $8x^2-1 = 3(3x^2+3)+6x$       7.  $5x^2-3x(2x-3)-7x = 2$       8.  $x^2-3(2x+2)-2x+23 = 0$   
 9.  $3(3x^2+3x)-17x+25 = 8x^2$       10.  $3(3x^2+2x)-10x^2-12x = 13$       11.  $6x^2-5 = 3x(3x-1)-x(2x+1)$       12.  $3(2x^2-3)-8 = 7x^2-2(2x+2)$

7. Resuelve la ecuación:

[ $ax^2+c=0$ ]

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

8. Resuelve la ecuación:

[ $ax^2+bx=0$ ]

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

9. Resuelve la ecuación:

[Dos sol.]

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

$$\begin{array}{llll}
 25. x^2 - \frac{x^2-3}{2} - \frac{(3x-4)(x+1)}{10} = 2 & 26. \frac{2x^2+1}{4} - x^2 = 1 - \frac{3x^2-3x+4}{8} & 27. \frac{9x^2+8x+2}{18} + \frac{x(2x-3)}{6} = x^2 & 28. \frac{x^2-3}{4} + \frac{x(x+2)}{2} - \frac{5}{8}x = x^2-1 \\
 29. \frac{x(x-3)}{2} - \frac{3x^2-2x-6}{10} + x^2 = 1 & 30. \frac{15x^2+14}{18} + \frac{x(3x-2)}{9} - x^2 = 1 & 31. \frac{3x(x+1)}{4} - x = x^2 - \frac{x^2+8x-2}{12} & 32. \frac{3x(x-1)}{4} - x^2 = 2 - \frac{6x^2+x+8}{12} \\
 33. \frac{3x^2-x+8}{20} + \frac{x(3x-2)}{4} - x^2 = 1 & 34. \frac{7x^2-13x+3}{27} - \frac{x(x+1)}{3} + x = 0 & 35. \frac{x(3x+2)}{2} - \frac{7x^2+14x-4}{12} = 1 & 36. 2x - \frac{x(x+1)}{5} - \frac{2x^2+7x-3}{10} = 0 \\
 37. \frac{19x^2+14x+4}{12} - \frac{x(3x+2)}{2} = 1 & 38. \frac{8x^2+x+4}{10} + \frac{x(3x+2)}{5} - x^2 = 1 & 39. \frac{x(3x+1)}{12} = x^2 - \frac{17x^2+2x-3}{24} & 40. \frac{x(x+3)}{8} - \frac{x^2-14}{16} - \frac{7}{16}x-1 = 0
 \end{array}$$

10. Resuelve la ecuación:

[Sol. doble]

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

11. Resuelve la ecuación:

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

$$\begin{array}{llll}
 1. x - \frac{4x^2+9}{24} = \frac{x(x+2)}{2} & 2. \frac{3x^2+2}{10} + \frac{3x^2+2}{5} - x^2 = 1 & 3. x^2 - \frac{20x^2-19}{27} = 1 - \frac{x^2+1}{3} & 4. \frac{2x^2+3}{3} - x^2 = 2 - \frac{8x^2+11}{27} \\
 5. \frac{7}{8} - \frac{x(x-1)}{4} - \frac{x(x+1)}{4} = 1 & 6. \frac{7x^2+8x-16}{24} - \frac{x(x-2)}{3} = x & 7. \frac{x(2x-1)}{2} - \frac{17x^2-8x-7}{16} = 1 & 8. \frac{2x(x-1)}{9} - \frac{7x^2-6x-18}{27} = 1 \\
 9. -\frac{x(2x+3)}{2} - \frac{3x^2-9x-2}{6} = 3 & 10. x^2 - \frac{x(2x+1)}{2} - \frac{x^2-5x-1}{10} = 1 & 11. \frac{17x^2+8x+1}{16} - \frac{x(2x-3)}{2} = 2x & 12. \frac{2x^2+6x-1}{12} - \frac{x(x-1)}{2} - x^2 = x
 \end{array}$$

12. Resuelve la ecuación:

[Sin sol.]

$$\begin{array}{llll}
 1. \frac{x^2+1}{3} - \frac{7x^2+6x-2}{18} = 1 & 2. 1 - \frac{x^2+4x+1}{12} = x - \frac{x^2+3}{6} & 3. \frac{x(x+3)}{5} - \frac{x(3x-2)}{10} - x = 1 & 4. \frac{3x^2+1}{2} - \frac{10x^2-2x-1}{6} = 1 \\
 5. \frac{x(2x+1)}{12} = x^2 - \frac{21x^2+2}{24} & 6. \frac{2x^2+3}{4} - \frac{7x^2+4x-2}{12} = 2 & 7. 1 - \frac{x(x-2)}{8} = \frac{10x^2+7}{12} - x^2 & 8. \frac{x(x+2)}{5} - \frac{(3x-5)(x+1)}{10} = 3 \\
 9. \frac{x^2-7x+2}{18} + \frac{x(2x+1)}{2} = x^2 & 10. \frac{3x^2-2x-2}{6} + \frac{x(x+2)}{3} = x^2 & 11. \frac{2x(x+1)}{3} - \frac{19x^2-6x-5}{30} = x & 12. \frac{x}{3} + \frac{x(x+1)}{3} - \frac{5}{12}(x^2+1) = x
 \end{array}$$

13. Resuelve la ecuación:

[ $ax^2+c=0$ ]

$$\begin{array}{llll}
 1. \frac{x-14}{3x+6} + \frac{4}{3} + \frac{x+1}{x} = -\frac{x-5}{3x} & 2. \frac{x-4}{x-2} - \frac{x-1}{x+2} + \frac{x^2-x+3}{x^2-4} = 2 & 3. -\frac{x+1}{x-1} - \frac{x-2}{x+1} - \frac{x^2+x-3}{x^2-1} = 1 & 4. \frac{x+1}{x-2} + \frac{x-2}{x+2} + \frac{x^2+x-3}{x^2-4} + 1 = 0 \\
 5. \frac{x-2}{x+2} - \frac{x^2+x+2}{x^2-4} - \frac{x+1}{x-2} = 6 & 6. -\frac{1}{4} - \frac{x-1}{x} - \frac{x^2+x-8}{2x^2} = \frac{x+1}{2x} & 7. \frac{x+19}{x-3} - \frac{1-x-x^2}{x^2-3x} + \frac{x+1}{x} + 6 = 0 & 8. \frac{3}{2} - \frac{x}{x+1} - \frac{x^2+x-10}{2x^2+2x} = \frac{x+1}{2x} \\
 9. \frac{x-1}{9x} - \frac{1}{x} = \frac{x-18}{9x+9} - \frac{x^2-x+1}{x^2+x} & 10. \frac{x^2+x+4}{4x^2-6x} + \frac{x+1}{2x} + \frac{x-12}{4x-6} = 2 & 11. \frac{2x-3}{18x-12} + \frac{x+1}{3x} = \frac{4}{3} - \frac{6x-1}{6x} & 12. -\frac{x+1}{6x} - \frac{x+1}{x} - \frac{x^2+x+6}{6x^2-6x} = \frac{1}{6}
 \end{array}$$

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

$$14. \frac{x-12}{x-1} = 2 - \frac{x+10}{x} - \frac{x^2+x+1}{x^2-x}$$

$$15. \frac{2-x}{x+3} - \frac{x^2+x+29}{x^2-9} - \frac{x+1}{x-3} = 6$$

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

$$17. \frac{x-1}{x+1} - \frac{x^2+x+13}{4x^2-4} + \frac{x+10}{4x+4} = 5$$

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

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

$$20. \frac{x^2+x-11}{x^2-1} + \frac{x+1}{x-1} - \frac{2-x}{x+1} + 1 = 0$$

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

$$22. \frac{3}{2} - \frac{2x-9}{4x-6} - \frac{x^2+x-13}{2x^2-3x} = \frac{x+1}{x}$$

$$23. \frac{1-2x}{2x} - \frac{x-19}{2x+6} - \frac{x^2+x+1}{x^2+3x} = 2$$

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

14. Resuelve la ecuación:

[ $ax^2+bx=0$ ]

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

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

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

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

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

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

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

$$8. \frac{x^2-x+6}{x^2-9} + \frac{x-7}{x-3} - \frac{x-1}{x+3} = 2$$

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

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

$$11. \frac{x+1}{x-1} = \frac{5-x}{x+1} - \frac{x^2+x-5}{x^2-1} - 1$$

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

$$13. \frac{x^2+x-13}{x^2-1} + \frac{x-5}{x+1} + \frac{x+1}{x-1} = 7$$

$$14. 2 - \frac{x}{x-3} - \frac{x^2+x-15}{x^2-9} = \frac{x+1}{x+3}$$

$$15. \frac{x-3}{x-2} + \frac{x^2+x-16}{x^2-4} + \frac{x+1}{x+2} = 6$$

$$16. \frac{x+1}{x-3} - \frac{1-x}{x+3} - \frac{24-x-x^2}{x^2-9} = 2$$

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

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

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

$$20. \frac{x+1}{3x+2} + \frac{x(x+1)}{9x^2-4} = \frac{2}{3} - \frac{3x-1}{9x-6}$$

$$21. \frac{1}{2} - \frac{8x+17}{8x+8} = \frac{x-1}{4x+4} - \frac{8x-11}{8x-8}$$

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

$$23. \frac{x+1}{2x-3} = 1 - \frac{x-1}{2x+3} - \frac{x^2+x-15}{4x^2-9}$$

$$24. \frac{6x-7}{18x-6} = \frac{2}{3} - \frac{2x+1}{6x+2} - \frac{x^2+x+1}{9x^2-1}$$

15. Resuelve la ecuación:

[Dos sol.]

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

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

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

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

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

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

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

$$8. \frac{x+1}{x+2} = 1 - \frac{x-5}{x-2} - \frac{x^2+x+9}{x^2-4}$$

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

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

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

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

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

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

$$15. \frac{x-4}{x-2} + \frac{x+1}{x+2} + \frac{x^2+x-13}{x^2-4} = 6$$

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

$$17. \frac{9-x}{x+2} - \frac{x^2+x-13}{x^2-4} - 1 = \frac{x+1}{x-2}$$

$$18. \frac{3}{4} - \frac{8x-7}{8x-8} - \frac{x+1}{4x-4} = \frac{8x+5}{8x+8}$$

$$19. \frac{x+1}{x-3} - \frac{32-x-x^2}{x^2-9} - \frac{3-x}{x+3} = 2$$

$$20. 6 + \frac{x+2}{x+1} + \frac{x+15}{x-1} + \frac{x^2+x+1}{x^2-1}$$

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

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

$$23. 5 - \frac{x^2+x+6}{x^2-3x} - \frac{x-13}{x-3} = \frac{x+1}{x}$$

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

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

$$26. \frac{13-x}{x-2} - \frac{(x+2)(x-1)}{x^2-2x} - \frac{x+1}{x} = 1$$

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

$$28. \frac{x+1}{x-1} - \frac{15-x}{x+1} - \frac{26-x-x^2}{x^2-1} = 6$$

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

$$30. 1 - \frac{x^2+x+1}{x^2-4} - \frac{2x-9}{2x-4} = \frac{2x-7}{2x+4}$$

$$31. \frac{2}{3} - \frac{x+1}{3x-2} - \frac{x(x+1)}{9x^2-4} = \frac{3x+1}{9x+6}$$

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

$$33. \frac{15-x}{x+2} - \frac{x^2+x-25}{x^2-4} - \frac{x+1}{x-2} = 1$$

$$34. 1 - \frac{x^2+x-5}{2x^2} - \frac{x-4}{2x} = \frac{x^2+x+1}{x^2}$$

$$35. \frac{1}{2} - \frac{(x+2)(x-1)}{6x^2} - \frac{x+1}{3x} = \frac{x-4}{6x}$$

$$36. \frac{x+13}{x-3} + \frac{x+1}{x+3} = -1 - \frac{x^2+x-31}{x^2-9}$$

$$37. \frac{x+1}{x-3} + \frac{x^2+x+8}{x^2-9} + \frac{x+1}{x+3} + 1 = 0$$

$$38. 1 - \frac{x+1}{x} - \frac{x+1}{3x+1} - \frac{x^2+x+2}{3x^2+x} = 0$$

$$39. \frac{x+20}{x-1} - \frac{x^2+x+39}{x^2-1} + \frac{x-1}{x+1} = 9$$

$$40. \frac{2}{3} - \frac{3x-7}{9x+3} - \frac{x^2+x+1}{9x^2-1} = \frac{x+4}{3x-1}$$

16. Resuelve la ecuación:

[Sol. doble]

$$\begin{array}{llll}
1. \frac{x+1}{x} + \frac{x-7}{x-3} = 2 - \frac{x^2+x+4}{x^2-3x} & 2. \frac{x+1}{x} + \frac{x-6}{x-2} + \frac{x^2+x+3}{x^2-2x} = 2 & 3. \frac{x+1}{4x-6} + \frac{3x-4}{6x} + \frac{3x-8}{6x-9} = 1 & 4. \frac{x+1}{x-2} + \frac{x+4}{x+2} = 2 - \frac{x^2+x+7}{x^2-4} \\
5. \frac{11-x}{x+1} - \frac{x-2}{x-1} - \frac{x^2+x+1}{x^2-1} = 1 & 6. \frac{1}{2} - \frac{2x-3}{4x} - \frac{x+1}{x} = \frac{4x-17}{4x+8} & 7. \frac{x-7}{x+1} + \frac{x+15}{x} + \frac{x^2+x+1}{x^2+x} = 2 & 8. \frac{x+6}{x-2} + \frac{x+1}{x} = -6 - \frac{x^2+x+3}{x^2-2x} \\
9. \frac{2-3x}{9x+3} - \frac{x+1}{x} - \frac{x+1}{3x+1} = \frac{11}{3} & 10. 7 - \frac{x-8}{3x+2} - \frac{x^2+x+1}{3x^2-2x} = \frac{x+1}{x} & 11. \frac{x-24}{3x-2} + \frac{x+1}{x} + \frac{x^2+x+1}{2x^2-2x} = 7 & 12. \frac{x-10}{x+2} + \frac{x+1}{x-2} = 2 - \frac{x^2+x-14}{x^2-4} \\
13. -6 - \frac{x^2+x+8}{2x^2+2x} - \frac{2x+9}{2x+2} = \frac{x+1}{2x} & 14. \frac{4x-5}{8x-4} + \frac{4x-1}{8x+4} + \frac{x^2+x+1}{4x^2-1} = 1 & 15. \frac{x+1}{x-1} + 1 = -\frac{x+10}{x+1} - \frac{x^2+x+19}{x^2-1} & 16. \frac{x+6}{3x-6} + \frac{x+1}{x-2} = \frac{1}{3} - \frac{x^2+x+9}{3x^2-6x} \\
17. \frac{2x+1}{2x+4} + \frac{2x-7}{2x-4} + \frac{x^2+x+1}{x^2-4} = 2 & 18. 2 - \frac{2x+7}{2x+6} - \frac{x^2+x+1}{x^2-9} = \frac{2x-5}{2x-6} & 19. \frac{x-1}{x+1} - \frac{x^2+x+14}{x^2-1} + \frac{x+4}{4x+4} = \frac{5}{4} & 20. \frac{2}{3} - \frac{x+1}{6x-3} - \frac{x^2+x+4}{6x^2-3x} = \frac{x}{2x-1} \\
21. \frac{x-1}{x+1} - \frac{x^2+x+29}{x^2-1} + \frac{x+10}{x-1} = 17 & 22. 2 - \frac{3x-7}{3x} - \frac{x^2+x+1}{x^2-3x} = \frac{3x-34}{6x-18} & 23. \frac{6-x}{2x-2} - \frac{x+1}{x-1} - \frac{2x^2+2x+1}{2x^2-2x} = 2 & 24. \frac{19-2x}{2x+4} - \frac{2x+5}{2x-4} - \frac{x^2+x+1}{x^2-4} = 6
\end{array}$$

17. Resuelve la ecuación:

[Sol. falsa]

$$\begin{array}{llll}
1. 1 - \frac{x^2+x-8}{x^2-1} - \frac{x+1}{x-1} = \frac{x-3}{x+1} & 2. 2 - \frac{x^2-x+2}{x^2-1} + \frac{x-1}{x+1} = \frac{x-6}{x-1} & 3. 4 - \frac{x-1}{x+1} = \frac{x+1}{x} - \frac{x^2+x+2}{x^2+x} & 4. \frac{x^2+x+1}{x^2-x} + \frac{x-4}{x-1} + \frac{x-1}{x} = 2 \\
5. \frac{x-3}{x-1} - \frac{x^2+x+4}{x^2-1} + \frac{x-1}{x+1} = 4 & 6. \frac{x+7}{x+3} + \frac{x+1}{x} + \frac{x^2+x+6}{x^2+3x} = 1 & 7. \frac{x+3}{3x} + \frac{x-1}{2x-1} = \frac{2}{3} - \frac{x+1}{6x-3} & 8. 6 - \frac{x-5}{x-1} - \frac{x^2+x+2}{x^2-x} = \frac{x+1}{x} \\
9. \frac{x-7}{x-1} + \frac{x^2+x+4}{x^2-x} + \frac{x+1}{x} = 5 & 10. 2 - \frac{x^2-x+6}{x^2-4} + \frac{x-1}{x+2} = \frac{x-7}{x-2} & 11. \frac{x+4}{x} + \frac{1+x}{2+x} - \frac{4-x-x^2}{x^2+2x} = 6 & 12. 2 - \frac{x^2+x-18}{x^2-9} - \frac{x+1}{x+3} = \frac{x-1}{x-3} \\
13. \frac{x+1}{x+2} - \frac{1-x}{x-2} - \frac{10-x-x^2}{x^2-4} = 2 & 14. 2 - \frac{x^2+x-36}{x^2-9} - \frac{x+1}{x-3} = \frac{x-4}{x+3} & 15. \frac{13-2x}{8x-12} - \frac{1+x}{2x} - \frac{1+x}{2x-3} = \frac{1}{4} & 16. 1 - \frac{x^2+x+1}{x^2-1} - \frac{2x+1}{2x+2} = \frac{2x-5}{2x-2} \\
17. \frac{1}{3} - \frac{x-7}{3x-3} - \frac{x^2+x+4}{3x^2-3x} = \frac{x+1}{3x} & 18. \frac{2x-7}{2x-2} + \frac{2x+3}{2x+2} + \frac{x^2+x+1}{x^2-1} = 1 & 19. 2 - \frac{2x+3}{2x-2} - \frac{x^2+x+1}{x^2-1} = \frac{2x+3}{2x+2} & 20. \frac{x+1}{2x+3} + \frac{x-2}{2x-3} = \frac{3}{4} - \frac{2x+5}{8x+12} \\
21. 6 - \frac{x^2+x-10}{x^2-1} - \frac{x-4}{x+1} - \frac{x+1}{x-1} = 0 & 22. \frac{x}{x-3} + \frac{x+1}{x+3} - \frac{(6+x)(5-x)}{x^2-9} = 4 & 23. \frac{2+x}{3x} + \frac{1+x}{2x+3} - \frac{3-x-x^2}{6x^2+9x} = \frac{2}{3} & 24. \frac{6x+1}{6x+18} = 2 - \frac{6x-31}{6x-18} - \frac{x^2+x+1}{x^2-9}
\end{array}$$

18. Resuelve la ecuación:

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

$$\begin{array}{llll}
1. 2 - \frac{x^2-x+1}{x^2-4} = \frac{x-4}{x-2} - \frac{x-1}{x+2} & 2. \frac{x^2+x+2}{x^2-x} + \frac{x-3}{x-1} + \frac{x+1}{x} = 2 & 3. \frac{x^2+x+4}{x^2-1} + \frac{x-2}{x+1} + \frac{x+1}{x-1} = 2 & 4. 7 - \frac{x-14}{x-2} - \frac{x^2+x+1}{x^2-2x} = \frac{x+1}{x} \\
5. 3 - \frac{x+7}{3x+1} - \frac{x^2+x+1}{3x^2+x} = x-2x & 6. \frac{x-1}{x+2} - \frac{x-4}{x-2} - \frac{x^2-x+46}{x^2-4} = 8 & 7. \frac{3}{2} - \frac{2x-1}{4x-6} - \frac{x^2+x+1}{2x^2-3x} = \frac{x-1}{x} & 8. \frac{2-x}{x+1} - \frac{x^2+x+11}{x^2-1} - \frac{x+1}{x-1} = 13 \\
9. \frac{1+x}{x+3} - \frac{(2+x)(1-x)}{x^2+2x} + \frac{1+x}{x} = 2 & 10. \frac{4x+1}{8x+4} + \frac{4x-3}{8x-4} + \frac{x^2+x+1}{4x^2-1} = 1 & 11. \frac{x+18}{x} - \frac{x^2+x+19}{x^2+x} + \frac{x-1}{x+1} = 17 & 12. \frac{10-x}{4x-4} - \frac{x^2+x+13}{4x^2-4} - \frac{x+1}{x-1} = \frac{3}{4}
\end{array}$$

19. Resuelve la ecuación:

[Sin sol.]

$$\begin{array}{llll}
1. 2 - \frac{x-2}{x-1} - \frac{x^2+x+1}{x^2-1} = \frac{x-1}{x+1} & 2. 2 - \frac{x-2}{x+3} - \frac{x^2+x+1}{x^2-9} = \frac{x-5}{x-3} & 3. 2 - \frac{x-2}{x+2} - \frac{x^2+x+3}{x^2+2x} = \frac{x+1}{x} & 4. \frac{3x-4}{9x} + \frac{x+1}{x} = 2 - \frac{9x+1}{9x+27} \\
5. 2 - \frac{x+4}{x+2} - \frac{x^2+x+11}{x^2-4} = \frac{x+1}{x-2} & 6. \frac{6x+5}{6x} + \frac{3x+1}{6x+9} = \frac{3}{2} - \frac{x+1}{4x+6} & 7. \frac{1+x}{x} + \frac{1+x}{3x-1} - \frac{24-x-x^2}{x^2-1} = 2 & 8. \frac{x-14}{x} + \frac{x+46}{3x+1} + \frac{x^2+x+1}{3x^2+x} = 2 \\
9. \frac{x^2+x+1}{4x^2-1} + \frac{4x-9}{8x+4} + \frac{4x+3}{8x-4} = 1 & 10. 2 - \frac{3x+4}{3x+9} - \frac{x^2+x+1}{x^2-9} = \frac{3x-13}{3x-9} & 11. \frac{x-16}{3x+3} + \frac{x+22}{3x} + \frac{x^2+x+1}{x^2+x} = \frac{4}{3} & 12. \frac{3}{2} - \frac{2x-3}{4x} - \frac{2x^2+2x+1}{8x^2+12x} = \frac{x+1}{x}
\end{array}$$

— Soluciones —

- 1.1.  $\pm 1$  1.2.  $\pm \frac{1}{4}$  1.3.  $\pm 2$  1.4.  $\pm \frac{1}{3}$  1.5.  $\pm 1$  1.6.  $\pm 3$  1.7.  $\pm 2$  1.8.  $\pm \frac{3}{2}$  1.9.  $\pm 1$  1.10.  $\pm \frac{1}{3}$  1.11.  $\pm 2$  1.12.  $\pm \frac{1}{3}$  1.13.  $\pm 1$  1.14.  $\pm \frac{3}{4}$  1.15.  $\pm \frac{3}{2}$  1.16.  $\pm \frac{2}{3}$
- 1.17.  $\pm 2$  1.18.  $\pm 1$  1.19.  $\pm \frac{3}{4}$  1.20.  $\pm 3$  1.21.  $\pm \frac{4}{3}$  1.22.  $\pm \frac{1}{4}$  1.23.  $\pm 1$  1.24.  $\pm \frac{3}{4}$  2.1.  $-2, 0$  2.2.  $0, \frac{1}{3}$  2.3.  $0, 1$  2.4.  $-\frac{2}{3}, 0$  2.5.  $0, 1$  2.6.  $-\frac{3}{4}, 0$  2.7.  $-1, 0$
- 2.8.  $-1, 0$  2.9.  $-1, 0$  2.10.  $-\frac{1}{2}, 0$  2.11.  $0, \frac{3}{4}$  2.12.  $0, 2$  2.13.  $0, \frac{3}{2}$  2.14.  $0, 3$  2.15.  $0, \frac{2}{3}$  2.16.  $0, 1$  2.17.  $0, \frac{1}{4}$  2.18.  $-1, 0$  2.19.  $-1, 0$  2.20.  $0, \frac{3}{2}$  2.21.  $0, 2$  2.22.  $0, \frac{4}{3}$  2.23.  $-3, 0$  2.24.  $-\frac{1}{2}, 0$  3.1.  $-2, \frac{1}{2}$  3.2.  $-2, \frac{1}{3}$  3.3.  $-1, \frac{2}{3}$  3.4.  $-3, -2$  3.5.  $-2, 1$  3.6.  $-1, \frac{1}{4}$  3.7.  $-\frac{2}{3}, \frac{4}{3}$  3.8.  $\frac{1}{2}, 2$  3.9.  $-1, \frac{1}{3}$  3.10.  $-\frac{2}{3}, \frac{4}{3}$
- 3.11.  $-\frac{1}{2}, 2$  3.12.  $-\frac{1}{4}, 1$  3.13.  $-\frac{1}{2}, 1$  3.14.  $\frac{1}{2}, 2$  3.15.  $-2, \frac{2}{3}$  3.16.  $-1, 2$  3.17.  $-1, \frac{1}{3}$  3.18.  $\frac{1}{4}, 1$  3.19.  $-3, 1$  3.20.  $-\frac{1}{3}, \frac{3}{2}$  3.21.  $-2, -1$  3.22.  $-\frac{3}{2}, 1$  3.23.  $-3, \frac{1}{4}$  3.24.  $-1, \frac{3}{2}$  3.25.  $\frac{1}{2}, \frac{3}{4}$  3.26.  $\frac{1}{3}, 2$  3.27.  $\frac{2}{3}, \frac{3}{2}$  3.28.  $-\frac{2}{3}, 3$  3.29.  $-4, \frac{4}{3}$  3.30.  $\frac{1}{2}, \frac{3}{2}$  3.31.  $-\frac{3}{4}, \frac{2}{3}$  3.32.  $-\frac{3}{2}, 2$  3.33.  $-\frac{3}{4}, \frac{3}{2}$  3.34.  $-\frac{1}{4}, 1$  3.35.  $-\frac{4}{3}, \frac{3}{4}$
- 3.36.  $-1, \frac{1}{2}$  3.37.  $-4, 1$  3.38.  $-3, \frac{1}{3}$  3.39.  $-2, \frac{1}{2}$  3.40.  $-2, \frac{1}{2}$  4.1.  $-1$  4.2.  $-1$  4.3.  $-1$  4.4.  $\frac{1}{3}$  4.5.  $\frac{1}{4}$  4.6.  $-4$  4.7.  $1$  4.8.  $\frac{1}{4}$  4.9.  $-\frac{1}{2}$  4.10.  $\frac{1}{2}$  4.11.  $-4$
- 4.12.  $-2$  4.13.  $-1$  4.14.  $\frac{3}{4}$  4.15.  $-1$  4.16.  $-\frac{3}{2}$  4.17.  $-\frac{1}{2}$  4.18.  $-\frac{4}{3}$  4.19.  $4$  4.20.  $\frac{3}{2}$  4.21.  $\frac{4}{3}$  4.22.  $-\frac{4}{3}$  4.23.  $2$  4.24.  $\frac{3}{4}$  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.  $\pm 2$  7.2.  $\pm 2$  7.3.  $\pm 4$  7.4.  $\pm \frac{3}{2}$  7.5.  $\pm 2$  7.6.  $\pm \frac{3}{2}$  7.7.  $\pm 4$
- 7.8.  $\pm 2$  7.9.  $\pm 1$  7.10.  $\pm \frac{1}{2}$  7.11.  $\pm \frac{1}{4}$  7.12.  $\pm 2$  7.13.  $\pm \frac{1}{3}$  7.14.  $\pm \frac{2}{3}$  7.15.  $\pm \frac{1}{2}$  7.16.  $\pm \frac{4}{3}$  7.17.  $\pm 2$  7.18.  $\pm 1$  7.19.  $\pm \frac{1}{2}$  7.20.  $\pm \frac{3}{2}$  7.21.  $\pm 2$  7.22.  $\pm \frac{4}{3}$
- 7.23.  $\pm \frac{3}{2}$  7.24.  $\pm 1$  8.1.  $0, 3$  8.2.  $0, 1$  8.3.  $0, 2$  8.4.  $0, 1$  8.5.  $0, 1$  8.6.  $0, \frac{1}{4}$  8.7.  $-1, 0$  8.8.  $0, \frac{4}{3}$  8.9.  $0, 1$  8.10.  $-1, 0$  8.11.  $0, \frac{1}{2}$  8.12.  $0, \frac{1}{2}$  8.13.  $0, \frac{1}{3}$  8.14.  $0, 3$  8.15.  $0, 1$  8.16.  $-1, 0$  8.17.  $0, \frac{3}{4}$  8.18.  $-\frac{1}{2}, 0$  8.19.  $-2, 0$  8.20.  $0, 1$  8.21.  $0, \frac{1}{4}$  8.22.  $0, \frac{2}{3}$  8.23.  $0, 2$  8.24.  $-\frac{1}{3}, 0$  9.1.  $-\frac{3}{2}, \frac{4}{3}$  9.2.  $-3, \frac{3}{2}$
- 9.3.  $1, \frac{4}{3}$  9.4.  $-\frac{3}{2}, 1$  9.5.  $\frac{1}{2}, 2$  9.6.  $-\frac{4}{3}, 2$  9.7.  $-1, \frac{4}{3}$  9.8.  $-\frac{1}{2}, 3$  9.9.  $-\frac{1}{4}, 1$  9.10.  $\frac{1}{3}, 1$  9.11.  $-4, 1$  9.12.  $-1, 3$  9.13.  $-\frac{3}{2}, \frac{3}{4}$  9.14.  $\frac{2}{3}, 2$  9.15.  $1, 3$  9.16.  $-\frac{2}{3}, 4$  9.17.  $-\frac{3}{2}, \frac{4}{3}$  9.18.  $-2, 4$  9.19.  $-\frac{1}{2}, 4$  9.20.  $-\frac{3}{4}, \frac{1}{2}$  9.21.  $-2, 1$  9.22.  $-3, \frac{1}{2}$  9.23.  $-\frac{4}{3}, \frac{1}{2}$  9.24.  $\frac{4}{3}, 3$  9.25.  $-1, \frac{1}{2}$  9.26.  $-2, -1$  9.27.  $-1, \frac{2}{3}$  9.28.  $-\frac{1}{2}, 2$
- 9.29.  $-\frac{1}{4}, \frac{4}{3}$  9.30.  $-\frac{2}{3}, 2$  9.31.  $\frac{1}{2}, 2$  9.32.  $-\frac{4}{3}, 4$  9.33.  $-4, \frac{3}{2}$  9.34.  $-\frac{1}{2}, 3$  9.35.  $-2, 4$  9.36.  $-\frac{1}{4}, 3$  9.37.  $-4, 2$  9.38.  $-2, \frac{3}{4}$  9.39.  $1, 3$  9.40.  $-1, 2$  10.1.  $\frac{1}{3}$
- 10.2.  $-\frac{2}{3}$  10.3.  $\frac{3}{2}$  10.4.  $-2$  10.5.  $-\frac{4}{3}$  10.6.  $-\frac{1}{3}$  10.7.  $-1$  10.8.  $-2$  10.9.  $-\frac{1}{2}$  10.10.  $-\frac{4}{3}$  10.11.  $\frac{1}{2}$  10.12.  $\frac{4}{3}$  10.13.  $-\frac{3}{2}$  10.14.  $1$  10.15.  $1$  10.16.  $-1$
- 10.17.  $\frac{1}{2}$  10.18.  $3$  10.19.  $-\frac{1}{4}$  10.20.  $-1$  10.21.  $\frac{3}{4}$  10.22.  $1$  10.23.  $\frac{2}{3}$  10.24.  $3$  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.  $\pm \frac{2}{3}$  13.2.  $\pm 1$  13.3.  $\pm \frac{1}{2}$  13.4.  $\pm \frac{1}{2}$  13.5.  $\pm \frac{4}{3}$  13.6.  $\pm \frac{4}{3}$  13.7.  $\pm \frac{2}{3}$  13.8.  $\pm 3$
- 13.9.  $\pm \frac{1}{3}$  13.10.  $\pm \frac{1}{2}$  13.11.  $\pm 1$  13.12.  $\pm \frac{1}{3}$  13.13.  $\pm \frac{1}{4}$  13.14.  $\pm 3$  13.15.  $\pm \frac{4}{3}$  13.16.  $\pm 1$  13.17.  $\pm \frac{1}{4}$  13.18.  $\pm 1$  13.19.  $\pm 1$  13.20.  $\pm \frac{3}{2}$  13.21.  $\pm \frac{1}{4}$  13.22.  $\pm 4$  13.23.  $\pm \frac{1}{3}$  13.24.  $\pm 2$  14.1.  $0, 1$  14.2.  $-\frac{1}{2}, 0$  14.3.  $-\frac{1}{4}, 0$  14.4.  $-\frac{4}{3}, 0$  14.5.  $-\frac{1}{2}, 0$  14.6.  $0, \frac{1}{4}$  14.7.  $-\frac{4}{3}, 0$  14.8.  $-1, 0$  14.9.  $0, \frac{4}{3}$  14.10.  $-1, 0$  14.11.  $0, \frac{3}{4}$  14.12.  $0, \frac{3}{4}$  14.13.  $-\frac{3}{4}, 0$  14.14.  $-2, 0$  14.15.  $-\frac{1}{3}, 0$  14.16.  $-1, 0$  14.17.  $0, 1$  14.18.  $0, \frac{1}{2}$  14.19.  $0, \frac{1}{2}$  14.20.  $-3, 0$  14.21.  $0, 4$  14.22.  $0, 4$  14.23.  $-1, 0$  14.24.  $0, 1$  15.1.  $\frac{1}{4}, \frac{1}{3}$  15.2.  $-\frac{4}{3}, -1$  15.3.  $-\frac{1}{4}, 1$  15.4.  $-1, \frac{1}{2}$  15.5.  $-1, \frac{1}{2}$  15.6.  $-\frac{3}{4}, 2$  15.7.  $1, 4$  15.8.  $\frac{1}{2}, 1$  15.9.  $-\frac{1}{2}, 3$  15.10.  $-3, -1$  15.11.  $-1, \frac{1}{2}$
- 15.12.  $-1, \frac{1}{2}$  15.13.  $-2, \frac{1}{4}$  15.14.  $-2, \frac{1}{3}$  15.15.  $-1, \frac{1}{3}$  15.16.  $\frac{1}{2}, 1$  15.17.  $\frac{3}{4}, 1$  15.18.  $-\frac{2}{3}, \frac{1}{2}$  15.19.  $-1, 2$  15.20.  $-\frac{4}{3}, \frac{2}{3}$  15.21.  $-\frac{4}{3}, \frac{1}{3}$  15.22.  $-\frac{1}{2}, \frac{3}{4}$
- 15.23.  $-1, \frac{3}{2}$  15.24.  $-2, \frac{3}{4}$  15.25.  $-\frac{1}{2}, 4$  15.26.  $-\frac{1}{4}, 4$  15.27.  $-1, 2$  15.28.  $-4, \frac{1}{3}$  15.29.  $-3, \frac{1}{2}$  15.30.  $\frac{1}{2}, 3$  15.31.  $-4, -1$  15.32.  $-\frac{3}{2}, 2$  15.33.  $\frac{1}{4}, 3$  15.34.  $-1, \frac{3}{2}$  15.35.  $-1, 2$  15.36.  $-4, \frac{1}{4}$  15.37.  $-1, \frac{1}{4}$  15.38.  $-\frac{3}{2}, -1$  15.39.  $\frac{3}{4}, \frac{3}{2}$  15.40.  $-4, -2$  16.1.  $1$  16.2.  $1$  16.3.  $2$  16.4.  $-3$  16.5.  $\frac{3}{2}$  16.6.  $\frac{1}{2}$  16.7.  $-4$
- 16.8.  $\frac{1}{3}$  16.9.  $-\frac{1}{4}$  16.10.  $\frac{1}{4}$  16.11.  $-\frac{1}{4}$  16.12.  $4$  16.13.  $-\frac{3}{4}$  16.14.  $1$  16.15.  $-\frac{3}{2}$  16.16.  $-\frac{3}{2}$  16.17.  $1$  16.18.  $-1$  16.19.  $-3$  16.20.  $-2$  16.21.  $\frac{1}{4}$  16.22.  $4$  16.23.  $\frac{1}{3}$  16.24.  $\frac{1}{3}$  17.1.  $\frac{3}{2}$  17.2.  $-3$  17.3.  $-\frac{1}{3}$  17.4.  $2$  17.5.  $-\frac{2}{3}$  17.6.  $-\frac{3}{2}$  17.7.  $-3$  17.8.  $-\frac{1}{3}$  17.9.  $-\frac{3}{2}$  17.10.  $-1$  17.11.  $\frac{2}{3}$  17.12.  $2$  17.13.  $-3$
- 17.14.  $-1$  17.15.  $-\frac{1}{3}$  17.16.  $-\frac{1}{2}$  17.17.  $\frac{3}{2}$  17.18.  $\frac{3}{2}$  17.19.  $-3$  17.20.  $2$  17.21.  $\frac{1}{3}$  17.22.  $-1$  17.23.  $-1$  17.24.  $1$  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.