Scheda di allenamento:
Sistemi di Disequazioni di 1° grado

Risoluzione e rappresentazione grafica

1. Sistemi di primo grado (Livello Base)

Parte Base 1. *Risolvi i seguenti sistemi di disequazioni:*

1. ■□□ $\begin{cases} x+4>0 \\ x-2>0 \end{cases}$ $[x>2]$

2. ■□□ $\begin{cases} 2x\leq 10 \\ x+1\geq 0 \end{cases}$ $[-1\leq x\leq 5]$

3. ■□□ $\begin{cases} x-1<0 \\ x-5>0 \end{cases}$ $[\textit{impossibile}]$

4. ■□□ $\begin{cases} 3x\leq 9 \\ x+2>0 \end{cases}$ $[-2<x\leq 3]$

5. ■□□ $\begin{cases} x<4 \\ x>6 \end{cases}$ $[\textit{impossibile}]$

6. ■□□ $\begin{cases} 2x-4>0 \\ x-5<0 \end{cases}$ $[2<x<5]$

7. ■□□ $\begin{cases} \frac{1}{2}x<\frac{3}{2} \\ x+3>0 \end{cases}$ $[-3<x<3]$

8. ■□□ $\begin{cases} 1-x<3 \\ x+4<4 \end{cases}$ $[-2<x<0]$

9. ■□□ $\begin{cases} x-2>0 \\ x-8>0 \end{cases}$ $[x>8]$

10. ■□□ $\begin{cases} 5x+10<0 \\ 4x\geq 0 \end{cases}$ $[\textit{impossibile}]$

11. ■□□ $\begin{cases} x+5<0 \\ 2x<4 \end{cases}$ $[x<-5]$

12. ■□□ $\begin{cases} 2x + 8 < 0 \\ x - 1 < 0 \end{cases}$ $[x < -4]$

13. ■□□ $\begin{cases} x - 3 > 0 \\ 10 - x > 0 \end{cases}$ $[3 < x < 10]$

14. ■□□ $\begin{cases} x + 4 > 0 \\ 2x \leq 6 \end{cases}$ $[-4 < x \leq 3]$

15. ■□□ $\begin{cases} 6x \leq 18 \\ x + 5 > 0 \end{cases}$ $[-5 < x \leq 3]$

16. ■□□ $\begin{cases} x + 2 > 2 \\ x - 1 < 0 \end{cases}$ $[0 < x < 1]$

17. ■□□ $\begin{cases} 4x - 8 \geq 0 \\ x - 5 < 0 \end{cases}$ $[2 \leq x < 5]$

18. ■□□ $\begin{cases} x + 6 > 0 \\ 3 - x \geq 0 \end{cases}$ $[-6 < x \leq 3]$

19. ■□□ $\begin{cases} 2x < 10 \\ x + 1 > 5 \end{cases}$ $[4 < x < 5]$

20. ■□□ $\begin{cases} x - 7 \leq 0 \\ x + 2 \geq 0 \end{cases}$ $[-2 \leq x \leq 7]$

2. Sistemi di tre disequazioni lineari - Livello base

21. ■□□ $\begin{cases} x+5>0 \\ x-1<0 \\ x\geq -2 \end{cases}$ $[-2 \leq x < 1]$

22. ■□□ $\begin{cases} 3x>6 \\ x<10 \\ x-4>0 \end{cases}$ $[4 < x < 10]$

23. ■□□ $\begin{cases} x+1\geq 0 \\ 6-x>0 \\ x<4 \end{cases}$ $[-1 \leq x < 4]$

24. ■□□ $\begin{cases} x-3<0 \\ x+1>0 \\ 2x\geq 0 \end{cases}$ $[0 \leq x < 3]$

25. ■□□ $\begin{cases} x>-4 \\ x\leq 5 \\ x-2<0 \end{cases}$ $[-4 < x < 2]$

26. ■□□ $\begin{cases} x\geq 0 \\ x<8 \\ x+2>5 \end{cases}$ $[3 < x < 8]$

27. ■□□ $\begin{cases} x-1<10 \\ x+4>0 \\ x<5 \end{cases}$ $[-4 < x < 5]$

28. ■□□ $\begin{cases} 2x\geq 0 \\ x-5\leq 0 \\ x+1>1 \end{cases}$ $[0 < x \leq 5]$

29. ■□□ $\begin{cases} x+6>0 \\ x-4<0 \\ 5x<10 \end{cases}$ $[-6 < x < 2]$

30. ■□□ $\begin{cases} x-2\geq 0 \\ x\leq 10 \\ x+1>4 \end{cases}$ $[3 < x \leq 10]$

31. ■□□ $\begin{cases} x+3>0 \\ x-5<0 \\ x\geq 0 \end{cases}$ $[0 \leq x < 5]$

32. ■□□ $\begin{cases} 2x>4 \\ x<10 \\ x-1>0 \end{cases}$ $[2 < x < 10]$

33. ■□□ $\begin{cases} x+2\geq 0 \\ 8-x>0 \\ x<5 \end{cases}$ $[-2 \leq x < 5]$

34. ■□□ $\begin{cases} x-4\leq 0 \\ x+1>0 \\ 3x\geq 0 \end{cases}$ $[0 \leq x \leq 4]$

35. ■□□ $\begin{cases} x>-1 \\ x\leq 6 \\ x-3<0 \end{cases}$ $[-1 < x < 3]$

36. ■□□ $\begin{cases} x+10>0 \\ x-4\leq 0 \\ 2x\geq -2 \end{cases}$ $[-1 \leq x \leq 4]$

37. ■□□ $\begin{cases} 3x<15 \\ x+2>0 \\ x\geq 1 \end{cases}$ $[1 \leq x < 5]$

38. ■□□ $\begin{cases} x-5<0 \\ x+4>0 \\ x\leq -6 \end{cases}$ $[\emptyset]$

39. ■□□ $\begin{cases} x+7\geq 0 \\ x<2 \\ 1-x\leq 0 \end{cases}$ $[1 \leq x < 2]$

40. ■□□ $\begin{cases} x>-10 \\ x<0 \\ 3x+9>0 \end{cases}$ $[-3 < x < 0]$

3. Sistemi di disequazioni avanzati

Parte Avanzata 1. *Risolvi i seguenti sistemi di disequazioni di livello avanzato:*

41. ■■■ $\begin{cases} \frac{x-1}{2} - \frac{2x(x+1)}{3} < \frac{1-2x^2}{3} + 1 \\ \frac{2}{3}(x-\frac{1}{4}) + \frac{1}{6} - (x-1)(x+1) \leq 1 - x^2 \end{cases}$ $[-11 < x \leq 0]$

42. ■■■ $\begin{cases} \frac{1}{3}(x + 2 - \frac{x+5}{2}) < \frac{x+4}{5} - \frac{x+3}{4} \\ 4[(4x-1)^2 + x] + (6x-1)^2 \leq 4x + (10x-1)^2 \end{cases}$ $\left[\frac{1}{6} \leq x < 1\right]$

43. ■■■ $\begin{cases} (2-x)(x+1) + \frac{(x+2)^2}{3} > x \cdot \frac{3-2x}{3} + x + 2 \\ \frac{x+1}{5} - 3(2x+1) < \frac{3-2x}{2} + \frac{1}{2} \end{cases}$ $[x > -1]$

44. ■■■ $\begin{cases} 4\left(\frac{1}{8}x - 2\right) - \frac{x}{4} \leq -\frac{x+3}{3} \\ \frac{1}{3}x + 2 > \frac{1}{2}x - \frac{x-5}{6} + 1 \end{cases}$ $[x \leq 12]$

45. ■■■ $\begin{cases} 5x + 1 \leq -2(x-11) \\ 4 - 4x > 11 \\ x - 3 > -(1-x) \end{cases}$ $[\textit{impossibile}]$

46. ■■■ $\begin{cases} \frac{x-1}{2} - \frac{x+1}{3} \leq 1 - \frac{x}{6} \\ (x-2)(x+2) > (x-1)^2 - 5 \end{cases}$ $\left[0 < x \leq \frac{11}{2}\right]$

47. ■■■ $\begin{cases} (x+3)^2 - x^2 < 2x + 10 \\ \frac{x-1}{2} - \frac{x-2}{3} \geq \frac{1}{6} \end{cases}$ $\left[0 \leq x < \frac{1}{4}\right]$

48. ■■■ $\begin{cases} (x-1)^3 - x^2(x-3) < 4x + 5 \\ \frac{2x-1}{3} \geq x - 1 \end{cases}$ $[-6 < x \leq 2]$

49. ■■■ $\begin{cases} \frac{1}{2}(x-2)^2 \leq \frac{x^2+4}{2} - x \\ (x+1)^2 - (x-1)^2 > 4 \end{cases}$ $[x > 1]$

50. ■■■ $\begin{cases} \frac{x-3}{4} - \frac{x+1}{2} < \frac{1-x}{8} \\ (x-1)(x+3) \geq x^2 - 4 \end{cases}$ $\left[x \geq -\frac{1}{2}\right]$

51. ■■■ $\begin{cases} (x-1)^3 - x(x+2)^2 + 7x^2 \leq 5x + 2 \\ \frac{x-1}{3} - \frac{x+2}{2} > -2 \end{cases}$ $\left[-\frac{1}{2} \leq x < 4\right]$

52. ■■■ $\begin{cases} \frac{(2x+1)^2}{4} - x(x-2) \geq \frac{1}{4} \\ (x+2)^2 - (x-1)^2 < 15 \end{cases}$ $[0 \leq x < 2]$

53. ■■■ $\begin{cases} (x-1)(x^2+x+1) - x^3 < 2x - 5 \\ \frac{1}{2}x - \frac{x-3}{4} \leq 1 \end{cases}$ $[\emptyset]$

54. ■■■ $\begin{cases} \frac{(x-2)(x+2)}{3} - \frac{x^2-1}{3} \geq x-2 \\ 5x-2(x-3)<12 \end{cases}$ $[x \leq 1]$

55. ■■■ $\begin{cases} (x+2)^3 - x^2(x+6) > 12x+5 \\ \frac{2x+3}{2} - \frac{3x-1}{4} \geq 1 \end{cases}$ $[x \geq -3]$

56. ■■■ $\begin{cases} \frac{x-1}{4} - \frac{2x-3}{2} \geq \frac{x}{8} \\ (x+2)^2 - (x-1)^2 < 15 \end{cases}$ $\left[x \leq \frac{10}{7}\right]$

57. ■■■ $\begin{cases} \frac{1}{3}(x-1)(x+1) - \frac{x^2-3}{3} \geq \frac{x-2}{2} \\ 4x-2(x-3)<10 \end{cases}$ $[x<2]$

58. ■■■ $\begin{cases} (x-1)^3 - x^2(x-3) \leq 4x+5 \\ \frac{2x-1}{3} \geq x-1 \end{cases}$ $[-6 \leq x \leq 2]$

59. ■■■ $\begin{cases} \frac{x+2}{3} - \frac{2x-1}{4} > \frac{x}{12} \\ (x+1)^2 - x(x+2) \leq 5 \end{cases}$ $\left[x < \frac{11}{3}\right]$

60. ■■■ $\begin{cases} \frac{(x-2)^2}{2} - \frac{x^2-4}{2} \leq x+1 \\ 3(x+1)-2(x-1)>0 \end{cases}$ $[x \geq 1]$

61. ■■■ $\begin{cases} (x+1)^3 - x^2(x+3) \leq 5x+2 \\ \frac{x-1}{2} - \frac{2x-3}{3} > \frac{1}{6} \end{cases}$ $\left[-\frac{1}{2} \leq x < 2\right]$

62. ■■■ $\begin{cases} \frac{2x+3}{2} - \frac{3x-1}{4} \geq 1 \\ (x-2)^2 - (x+1)^2 > -9 \end{cases}$ $[-3 \leq x < 2]$

63. ■■■ $\begin{cases} (2x-1)^2 - 4x(x+2) \leq 5 \\ \frac{x-1}{3} - \frac{x+1}{2} > -1 \end{cases}$ $\left[-\frac{1}{3} \leq x < 1\right]$

64. ■■■ $\begin{cases} \frac{x-1}{2} - \frac{2x+1}{3} < \frac{x}{6} \\ (x+1)^3 - x(x^2+3x) \geq 4x-1 \end{cases}$ $\left[-\frac{5}{2} < x \leq 2\right]$

65. ■■■ $\begin{cases} \frac{x-2}{3} - \frac{x+2}{4} > \frac{x-10}{12} \\ 2(x-3)^2 - 2x^2 + 12x \leq 18 \end{cases}$ $[\textit{impossibile}]$

66. ■■■ $\begin{cases} (x-2)^3 - x(x-3)^2 \leq 4 \\ \frac{2x-1}{4} - \frac{x+1}{3} < \frac{x-13}{12} \end{cases}$ $[x < -6]$

67. ■■■ $\begin{cases} \frac{1}{2}(x+1)^2 - \frac{1}{2}(x-1)^2 \geq 3x-1 \\ (x+2)(x-2) - (x-3)^2 \leq 5 \end{cases}$ $[x \leq 1]$

68. ■■■ $\begin{cases} \frac{(x-1)(x+1)}{2} - \frac{(x-2)^2}{2} > 3 \\ 4x - \frac{2x-1}{3} \leq 11 \end{cases}$ $\left[\frac{11}{4} < x \leq \frac{16}{5}\right]$

69. ■■■ $\begin{cases} (x+1)^3 - x^2(x+3) < 4x - 2 \\ \frac{x-1}{2} + \frac{x+1}{3} \geq \frac{5x-1}{6} \end{cases}$ $[x > 3]$

70. ■■■ $\begin{cases} \frac{x+1}{3} - \frac{x-1}{2} > 1 \\ x - \frac{x-2}{3} \leq 1 \end{cases}$ $[x < -1]$

4. Sistemi di disequazioni letterali

Parte Avanzata 2. *Risolvi i seguenti sistemi di disequazioni nell'incognita x, discutendo i risultati in base ai valori dei parametri reali:*

71. ■■■ $\begin{cases} ax < 3a \\ x + 2 > 0 \end{cases}$ *(con $a \neq 0$)* $[a > 0, -2 < x < 3; a < 0, x > 3]$

72. ■■■ $\begin{cases} ax \geq a^2 \\ x < a + 1 \end{cases}$ *(con $a \neq 0$)* $[a > 0, a \leq x < a + 1; a < 0, x \leq a]$

73. ■■■ $\begin{cases} bx > 2 \\ 2bx < 8 \end{cases}$ *(con $b \neq 0$)* $\left[b > 0, \frac{2}{b} < x < \frac{4}{b}; b < 0, \frac{4}{b} < x < \frac{2}{b}\right]$

74. ■■■ $\begin{cases} x + m^2 > 0 \\ 2x - m^2 < 0 \end{cases}$ $\left[-m^2 < x < \frac{m^2}{2}\right]$

75. ■■■ $\begin{cases} a(x - 2) > a^2 \\ 3x < 3a + 12 \end{cases}$ *(con $a \neq 0$)* $[a > 0, a + 2 < x < a + 4; a < 0, x < a + 2]$

76. ■■■ $\begin{cases} ax - a^2 > 0 \\ x - 2a < 0 \end{cases}$ *(con $a \neq 0$)* $[se\ a > 0, a < x < 2a;\ se\ a < 0, 2a < x < a]$

77. ■■■ $\begin{cases} (k - 1)x \leq k^2 - 1 \\ x + 1 > 0 \end{cases}$ $(k \neq 1)$ $\left[\begin{array}{l} k > 1 \implies -1 < x \leq k + 1 \\ k < 1 \implies x \geq k + 1 \end{array}\right]$

78. ■■■ $\begin{cases} 2ax \geq 4a \\ x - a < 3 \end{cases}$ *(con $a \neq 0$)* $[se\ a > 0, 2 \leq x < a + 3;\ se\ a < 0, disc.\ x]$

79. ■■■ $\begin{cases} mx - m \leq 0 \\ x + m^2 > 0 \end{cases}$ *(con $m \neq 0$)* $[se\ m > 0, -m^2 < x \leq 1;\ se\ m < 0, x \geq 1]$

80. ■■■ $\begin{cases} a(x - 1) < a(2 - a) \\ x + a > 1 \end{cases}$ $(a \neq 0)$ $\left[\begin{array}{l} a > 0 \implies 1 - a < x < 3 - a \\ a < 0 \implies x > 3 - a \end{array}\right]$