

**ESERCIZI DISEQUAZIONI
DI I GRADO INTERE**

La risoluzione di una generica disequazione numerica di primo grado intera

58 ESERCIZIO GUIDATO

Risolvi le disequazioni seguenti:

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

a. $(2x - 3)^2 \geq 4x^2 \Rightarrow 4x^2 - \dots + 9 \geq 4x^2 \Rightarrow \dots \geq -9 \Rightarrow x \leq \dots$

b. $\frac{1}{2}x - 1 \geq -\frac{1}{3}x + \frac{1}{2} \Rightarrow 6\left(\frac{1}{2}x - 1\right) \geq 6\left(-\frac{1}{3}x + \frac{1}{2}\right) \Rightarrow 3x - \dots \geq \dots + 3 \Rightarrow 5x \geq \dots \Rightarrow x \geq \dots$

Risolvi le seguenti disequazioni lineari a coefficienti interi.

59 $2(x - 1) - x > 3 - x$ $\left[x > \frac{5}{2} \right]$ **72** $11 - (2^{12} : 2^9)x \geq -3(1 - 2x)$ $[x \leq 1]$

60 $x - (x - 2) + 2(x + 3) > 1 - (2 - 3x)$ $[x < 9]$ **73** $-2[(3^5 \cdot 3^7) : (3^2)^5 - x] > 6 - 6x$ $[x > 3]$

61 $3(x - 1) - 2(x + 2) < -3(x - 1)$ $\left[x < \frac{5}{2} \right]$ **74** $5 - [(10^2)^7 : 10^{13}]x \geq 3(2 - 4x)$ $\left[x \geq \frac{1}{2} \right]$

62 $1 - 2(x + 3) - (3 - x) \leq 3(2 - x)$ $[x \leq 7]$ **75** $-2 - [2x - (10^{13}x - 10^{12}) : 10^{11}] \geq (10^{14} : 10^{12})x$ $[x \leq -6]$

63 $3(x - 1) - (x + 7) < 2(1 - x) + 1$ $\left[x < \frac{13}{4} \right]$ **76** $22 - (2^{15}x - 2^{13}) : (2^4)^3 \geq 3x - 2(3 - 2x)$ $[x \leq 2]$

64 $3(x - 1) - 2(x - 1) - (1 - x) > 1 + 8x$ $\left[x < -\frac{1}{2} \right]$ **77** $-2x(3 - x) \geq (2x - 1)(x + 2)$ $\left[x \leq \frac{2}{9} \right]$

65 $-2[3 - 2(x + 1)] \geq 2 - [-2(x + 1) + 3x]$ $\left[x \geq \frac{6}{5} \right]$ **78** $(6x - 1)(2x - 3) \leq (4x - 1)(3x + 2)$ $\left[x \geq \frac{1}{5} \right]$

66 $2 - 3[x - 2(x + 1)] > 1 + x - [-1 - (x + 1)]$ $[x > -5]$ **79** $(2 - 3x)(2x - 1) \geq (1 - 6x)x$ $\left[x \geq \frac{1}{3} \right]$

67 $2(x - 1) - 3(x + 1) < -2[-x + (x - 1)]$ $[x > -7]$ **80** $-2(x + 3) < (x + 1)^2 + (3 - x)x$ $[x > -1]$

68 $-3[-2(-2x + 3) - 1] \leq 6$ $\left[x \geq \frac{5}{4} \right]$ **81** $x^2 - (x + 1)^2 \geq (x + 2)^2 - (x - 1)(x + 1)$ $[x \leq -1]$

69 $1 - [2(3 - 2x) - 3(1 - x)] < -2x$ $\left[x < \frac{2}{3} \right]$ **82** $(x + 1)^2 + (x - 2)^2 \geq (2x - 1)(x + 2)$ $\left[x \leq \frac{7}{5} \right]$

70 $1 \geq [2x - 4(-x - 1)] - (4 - x)$ $\left[x \leq \frac{1}{7} \right]$ **83** $x^2 + (2x - 3)(x + 1) < x(x - 1) + (2x - 1)^2 - 2x^2$ $[x < 1]$

71 $-4x < 5x - [-3(x - 2) + 18]$ $[x > 2]$ **84** $(x - 3)^2 - x(x + 1) < (x + 4)^2 - (x + 3)^2$ $\left[x > \frac{2}{9} \right]$

85 $(x + 1)^3 - x^3 \leq (3x + 1)(x - 2)$ $\left[x \leq \frac{3}{8} \right]$

86 $(x - 2)^3 - (x - 4)(x - 1)^2 \geq 0$ $\left[x \geq \frac{4}{3} \right]$

87 $(1 - 2x)(1 + 2x) + (-1 + 2x)^2 \geq -1$ $\left[x \leq \frac{3}{4} \right]$

88 $(2x - 3)^2 + (1 - 3x)^2 \geq (4x - 1)(4x + 1) - 3x^2$ $\left[x \leq \frac{11}{18} \right]$

89 $(-2x + 3)(-2x - 3) + (2x - 3)(-2x + 3) \geq 9$ $\left[x \geq \frac{9}{4} \right]$

90 $(x^2 + x + 2)^2 - x^2(x^2 + 5) \geq 2x(x - 3)(x + 3)$ $\left[x \geq -\frac{2}{11} \right]$

91 $(2x - 1)^3 - 8x^3 \geq 3(1 - 2x)(1 + 2x)$ $\left[x \geq \frac{2}{3} \right]$

92 $(x^2 + 2x - 3)^2 - (x^2 - 2)(x^2 + 2) > 2x^2(2x - 3) + (2x - 1)(2x + 1)$ $\left[x < \frac{7}{6} \right]$

Risolvi le seguenti disequazioni lineari a coefficienti frazionari.

$$93 \quad \frac{1}{3}x - x \geq -\frac{1}{6} + \frac{1}{2} \quad \left[x \leq -\frac{1}{2} \right]$$

$$94 \quad \frac{1}{2}x - \frac{1-x}{3} > 1 \quad \left[x > \frac{8}{5} \right]$$

$$95 \quad \frac{1}{2}x - \frac{1}{3} > \frac{2}{3}x - \frac{1}{2} \quad \left[x < 1 \right]$$

$$96 \quad -\frac{1}{2}\left(x + \frac{3}{2}\right) \geq 2 \quad \left[x \leq -\frac{11}{2} \right]$$

$$97 \quad \frac{1}{2}\left(1 - \frac{2}{5}x\right) > \frac{3}{2} - \frac{1}{10}x \quad \left[x < -10 \right]$$

$$98 \quad \frac{3}{4}\left(-\frac{x}{3} + 2\right) < \frac{x}{3} - \frac{11}{2} \quad \left[x > 12 \right]$$

$$99 \quad -\frac{2}{3}\left(\frac{3}{2}x - \frac{x-2}{4}\right) \leq \frac{1}{12} \quad \left[x \geq -\frac{1}{2} \right]$$

$$100 \quad \frac{9}{40} - \frac{1}{5}x > -\frac{5}{2}\left(\frac{1}{10} - \frac{x-1}{4}\right) \quad \left[x < \frac{4}{3} \right]$$

$$101 \quad \left(-\frac{x}{2}\right) : \frac{1}{3} + \left(\frac{4}{3}x\right) : \left(-\frac{2}{3}\right) \geq \frac{7}{4} \quad \left[x \leq -\frac{1}{2} \right]$$

$$102 \quad \left(-\frac{5}{2}x\right) : \frac{3}{2} + \left(\frac{15}{4}x\right) : \left(-\frac{9}{8}\right) < -\frac{1}{6} \quad \left[x > \frac{1}{30} \right]$$

$$103 \quad 1 < \left(\frac{1}{3} - \frac{x}{2}\right) : \left(-\frac{1}{6}\right) - \frac{2x - (3-x)}{4} \quad \left[x > 1 \right]$$

$$104 \quad \frac{x-1}{2} - \frac{2-x}{3} > \frac{1}{3} - \frac{1}{3}x \quad \left[x > \frac{9}{7} \right]$$

$$105 \quad \frac{1}{5}(x-10) > \frac{x-1}{10} - \frac{2-x}{15} \quad \left[x > 53 \right]$$

$$106 \quad \frac{x-1}{6} - \frac{1}{12} > \frac{1}{2}x - 1 \quad \left[x < \frac{9}{4} \right]$$

$$107 \quad \frac{x}{15} - \frac{2-x}{6} > \frac{1}{2}x \quad \left[x < -\frac{5}{4} \right]$$

$$108 \quad \frac{x+1}{3} - \frac{2-x}{4} > \frac{2(x+3)}{9} \quad \left[x > \frac{30}{13} \right]$$

$$109 \quad \frac{1}{3}x - \frac{x-2}{2} \geq \frac{1}{15}x - \frac{1}{10} \quad \left[x \leq \frac{33}{7} \right]$$

$$124 \quad \frac{1}{2}x[2 - (x+2)] > -2(x+3) + (x-1)(x+1) - \frac{3}{2}x^2 \quad \left[x > -\frac{7}{2} \right]$$

$$125 \quad \frac{(2-3x)^2}{6} + \left(\frac{1}{2}x - 1\right)^2 \geq \frac{21}{12}x^2 \quad \left[x \leq \frac{5}{9} \right]$$

$$126 \quad \frac{\frac{1}{2}x - 3}{3} + \frac{1}{9}x \leq \frac{x - \frac{1}{3}}{2} - \frac{1-x}{6} \quad \left[x \geq -\frac{12}{7} \right]$$

$$127 \quad \frac{1}{3}\left[x - \frac{1}{2}(x+2)\right] \geq (x+1)^2 - x^2 - \frac{2-x}{6} \quad \left[x \leq -\frac{1}{2} \right]$$

$$128 \quad \frac{1}{2}x - \left[\left(\frac{x+1}{2}\right)^2 - \left(\frac{x-1}{2}\right)^2\right] + \frac{1}{2}x^2 \geq \left[\left(\frac{x+1}{2}\right)^2 + \left(\frac{x-1}{2}\right)^2\right]^2 - \frac{1}{4}x^4 \quad \left[x \leq -\frac{1}{2} \right]$$

4. Disequazioni numeriche intere di primo grado

$$110 \quad \frac{2(x-1)}{3} - 3 \cdot \frac{x-1}{2} \geq \frac{2-x}{18} \quad \left[x \leq \frac{13}{14} \right]$$

$$111 \quad \frac{x-1}{15} - \frac{2-x}{10} \geq -\frac{3-x}{3} - \frac{1}{2}[2 - (x-4)] \quad \left[x \leq \frac{28}{5} \right]$$

$$112 \quad -\frac{1}{2}(x+4) + \frac{1}{3}\left[x - \frac{1}{2}(2-x)\right] \leq \frac{x-2}{12} \quad \left[x \geq -26 \right]$$

$$113 \quad -\frac{1}{5}\left[5x - \frac{1}{2}(x-5)\right] \geq \frac{1}{10} - x \quad \left[x \geq 6 \right]$$

$$114 \quad \left(\frac{2}{3}\right)^{-2}x + \frac{4-x}{2} < \left(\frac{8}{9}\right)^{-1} \quad \left[x < -\frac{1}{2} \right]$$

$$115 \quad \left(\frac{1}{2} - \frac{3}{4}\right)^{-2} : \left(-\frac{4}{3}\right) + \frac{3x-2}{6} \leq \frac{1}{3}(-2)^{-2} - 10 \quad \left[x \leq \frac{29}{6} \right]$$

$$116 \quad \left(\frac{1}{2}x + 3\right)(2x-1) + \left(\frac{x}{3} - 2\right)\left(3x - \frac{1}{2}\right) < 2x^2 \quad \left[x > -3 \right]$$

$$117 \quad \left(\frac{x}{3} + \frac{9}{8}\right)(3x-2) < \left(1 - \frac{x}{2}\right)(2x-1) + 2x^2 \quad \left[x < 6 \right]$$

$$118 \quad \text{Videolezione} \quad \frac{(x-1)^2}{5} - \frac{(x+1)^2}{4} > -\frac{x^2}{20}$$

$$119 \quad \frac{1}{5}\left[\frac{(x-5)^2}{2} - \frac{(x+5)^2}{2}\right] \geq \frac{x-10}{2} \quad \left[x \geq -\frac{10}{3} \right]$$

$$120 \quad \left(\frac{3}{2}x - 4\right)^2 - \left(\frac{3}{2}x - 1\right)\left(\frac{3}{2}x + 2\right) \geq 9 \quad \left[x \leq \frac{2}{3} \right]$$

$$121 \quad \frac{(x-1)^2}{4} - \frac{(2-x)^2}{16} \geq \frac{3}{16}x^2 + 1 \quad \left[x \leq -4 \right]$$

$$122 \quad \frac{x-1}{2} - \frac{1}{3} \geq \frac{3(x-2)}{2} \quad \left[x \geq \frac{2}{3} \right]$$

$$123 \quad \left(\frac{1}{3}x - 1\right)^3 - \frac{1}{27}x^3 \geq \frac{1}{3}(3-x)(3+x) \quad \left[x \geq 4 \right]$$

ESERCIZI

Le disequazioni impossibili e le disequazioni sempre verificate

129 ESERCIZIO GUIDATO

Stabilisci se le seguenti disequazioni sono impossibili o sempre verificate:

a. $2(x+1) - x > x + 2$ b. $3x \leq x + 2(x+1)$

a. Svolgendo i calcoli, portando i termini dipendenti da x al primo membro e quelli numerici al secondo, infine riducendo i termini simili ottieni la disequazione

$$0x > \dots\dots\dots$$

che, per ogni valore reale di x , si trasforma nella disuguaglianza $0 > \dots\dots\dots$. Poiché questa disuguaglianza è *falsa*, la disequazione è $\dots\dots\dots$. L'insieme delle soluzioni è vuoto.

b. Svolgendo i calcoli, portando i termini dipendenti da x al primo membro e quelli numerici al secondo, infine riducendo i termini simili ottieni la disequazione

$$0x \leq \dots\dots\dots$$

che, per ogni valore reale di x , si trasforma nella disuguaglianza $0 \leq \dots\dots\dots$. Poiché questa disuguaglianza è *vera*, la disequazione è $\dots\dots\dots$. L'insieme delle soluzioni è \mathbb{R} .

Stabilisci se le seguenti disequazioni sono impossibili o sempre verificate.

- | | | | |
|------------------------------------|------------------------------|---|------------------------------|
| 130 $2(x-1) - x > x + 3$ | [Impossibile] | 136 $2(x-1) + 3(x-2) \geq 5(x-3)$ | $[\forall x \in \mathbb{R}]$ |
| 131 $3(x+3) - x > 2x + 8$ | $[\forall x \in \mathbb{R}]$ | 137 $3(x+1) + 2(x+3) \geq 2x + 3(x+3)$ | $[\forall x \in \mathbb{R}]$ |
| 132 $-4(x+1) < 2x - 6(x+3)$ | [Impossibile] | 138 $\left(\frac{1}{2}x - 1\right)^2 - \left(\frac{1}{2}x + 3\right)^2 \geq -4(x+3)$ | $[\forall x \in \mathbb{R}]$ |
| 133 $-3x > 3(1-x)$ | [Impossibile] | 139 $\frac{(x-1)^2}{5} - \frac{(x+1)^2 + x^2}{10} \geq 1 - \frac{3}{5}x$ | [Impossibile] |
| 134 $2x + 2(x-1) \leq 4x$ | $[\forall x \in \mathbb{R}]$ | | |
| 135 $-x \geq 1 - x$ | [Impossibile] | | |

140 Completa la disequazione $x - 2 > 2x - (x + \dots\dots\dots)$ in modo che il suo insieme delle soluzioni sia \mathbb{R} .

141 Completa la disequazione $3x - 2 > x + \dots\dots\dots$ in modo che il suo insieme delle soluzioni sia vuoto.

Esercizi riassuntivi: le disequazioni di primo grado numeriche intere

A mente

Risolvi, a mente, le seguenti disequazioni.

- | | |
|---------------------------|------------------------------|
| 142 $-2x < 0$ | 145 $3x - 6 < 0$ |
| 143 $x + 8 \geq 0$ | 146 $1 > \frac{x}{2}$ |
| 144 $2x + 10 > 0$ | 147 $3x \geq 5x$ |

Risolvi le seguenti disequazioni.

- | | | | |
|--|--------------------------------------|---|---------------------------------------|
| 148 $x + 3(2x - 1) \geq x$ | $\left[x \geq \frac{1}{2} \right]$ | 155 $x^2 - 4 - (2x - 1)(2x + 1) \geq (1 - 3x)(1 + 3x) + 6x^2$ | [Impossibile] |
| 149 $0,1x - \frac{1}{2} \geq x - 0,2$ | $\left[x \leq -\frac{1}{3} \right]$ | 156 $\frac{1}{5}x - \frac{x-1}{2} \leq \frac{1}{15}x - \frac{1}{10}$ | $\left[x \geq \frac{18}{11} \right]$ |
| 150 $x + 2(x - 4) \leq 3x$ | $[\forall x \in \mathbb{R}]$ | 157 $\frac{x+1}{15} - \frac{2(x-1)}{3} \geq -\frac{1}{2}x - \left(\frac{3}{5} - \frac{2-x}{10}\right)$ | $[\forall x \in \mathbb{R}]$ |
| 151 $\frac{2}{3}(3x + 1) \leq \frac{3}{2}\left(2x + \frac{4}{9}\right)$ | $[x \geq 0]$ | 158 $\frac{x-0,5}{3} - \frac{1}{12}x \geq \frac{x-0,3}{2}$ | $[x \leq 0]$ |
| 152 $\frac{2}{5}(x-1) - \frac{1}{2}(2x-3) \leq 2$ | $\left[x \geq -\frac{3}{2} \right]$ | 159 $10^{-1}(x+1) \geq \frac{x-10}{100} + 0,01x$ | $\left[x \geq \frac{5}{2} \right]$ |
| 153 $-2(x-2) + 3(1-x) > -2[x - 2(1-x)]$ | $[x > -3]$ | 160 $0,1x - \frac{x-5}{25} \geq \frac{1}{10}x - 10^{-2}(3-x)$ | $\left[x \leq \frac{23}{5} \right]$ |
| 154 $\frac{1}{5}(x-1)^2 - \frac{(x+1)^2}{10} > \frac{x^2}{10}$ | $\left[x < \frac{1}{6} \right]$ | | |

4. Disequazioni numeriche intere di primo grado

- 1671 $(2x-1)^2 + (2x+1)^2 \leq (1-2x)^2 + (-2x-1)^2 + 10$ [$\forall x \in \mathbb{R}$]
- 1672 $[(2x-1)^3 + (1-2x)^3][(2x-1)^2 - (2x+1)^2] > 2$ [Impossibile]
- 1673 $[(x-1)^2 - (x+1)^2]^2 \leq (8x+1)(2x-3)$ [$x \leq -\frac{3}{22}$]
- 1674 $(x-1)^3 - (x+1)^3 \geq (x-1)^2 - 7(x-1)(x+1)$ [$x \geq 5$]
- 1675 $(x-1)(x-2)(x+2) - (x-1)(x+1)(x-2) \geq (x-1)^2$ [$x \leq 1$]
- 1676 $(x-1)(x-2)(x+3) - (x-1)(x-2)(x-3) - 6(x-1)(x+2) \geq 1$ [$x \leq \frac{23}{24}$]
- 1677 $(x-3)^2 - (x+3)^2 < (x+3)(x-3) - x(x+12)$ [Impossibile]
- 1678 $0,1(x-5) + 0,2(x+2) \geq 0,1(x-10)$ [$x \geq -\frac{9}{2}$]
- 1679 $0,1(x-3) + 0,2(x+6) \geq 0,1(x-2)$ [$x \geq -\frac{11}{2}$]
- 1670 $\frac{x+3}{3} + \frac{x+2}{2} + (x-1)^2 \geq (x-2)(x+2)$ [$x \leq 6$]
- 1671 $x^2 - (x+1)^2 \geq \frac{x-1}{2} - \frac{x+1}{4}$ [$x \leq -\frac{1}{9}$]
- 1672 $\frac{x-1}{4} + \frac{2-x}{3} < \frac{x}{2} + \frac{x-3}{6}$ [$x > \frac{11}{9}$]
- 1673 $\frac{x-2}{5} + \frac{1-x}{2} > \frac{3-x}{15} + \frac{x-3}{10}$ [$x < \frac{3}{5}$]
- 1674 $(x-\frac{1}{2})^2 - (x+\frac{1}{2})^2 \leq (x+2)(x-2) - (x+1)(x-3)$ [$x \geq \frac{1}{4}$]
- 1675 $(x+\frac{1}{2})^2 - (x-\frac{3}{2})^2 \geq (\frac{x-1}{2})(\frac{x+1}{2}) - \frac{1}{4}x^2$ [$x \geq \frac{1}{4}$]
- 1676 $x(\frac{1}{2} + \frac{1}{3})^{-1} - (1 - \frac{x}{2})(1 + \frac{x}{2}) \geq (1 - \frac{3}{4}x)x + (x-3)(x+2)$ [$x \geq -\frac{25}{6}$]
- 1677 $x(\frac{1}{2} - \frac{1}{3})^{-1} + \frac{(x-1)^2}{2} + \frac{1}{2}x^2 \geq 5x(\frac{1}{2} + \frac{1}{3})^{-1} + \frac{(2x-1)^2}{4}$ [$\forall x \in \mathbb{R}$]
- 1678 $\frac{x-1}{2} - \frac{x-3}{4} - \frac{5}{6}x > \frac{4+3x}{12}$ [$x < \frac{5}{4}$]
- 1679 $\frac{x-\frac{1}{2}}{3} + \frac{\frac{1}{3}-x}{2} > \frac{x}{\frac{1}{2}-\frac{1}{3}}$ [$x < 0$]
- 1680 $\frac{x-2}{4} : (-\frac{2}{3})^{-2} \geq (1-x)(\frac{2}{3} - \frac{3}{2})^{-1}(-\frac{5}{36})$ [$x \geq \frac{7}{5}$]
- 1681 $\frac{x-1}{4}(1 - \frac{1}{2} - \frac{1}{4})^{-2} + (6-3x)(\frac{1}{2} + \frac{1}{4})^{-2} \geq -\frac{x}{3}$ [$x \leq \frac{20}{3}$]
- 1682 $(2x-2^{-1})^2 - (3x-3^{-2})^2 + (\frac{1}{9} - \frac{1}{2})(\frac{1}{9} + \frac{1}{2}) \geq (1-2x)(1+2x) - x^2$ [$x \leq -\frac{3}{4}$]