Disequazioni goniometriche intere

indice

Gli esercizi sono proposti in ordine di difficoltà crescente.
nota: in un file così lungo e complesso può accadere che sia presente un errore di diversa natura nonostante gli esercizi siano stati controllati più volte. Saremo grati di ricevere segnalazioni di eventuali refusi o suggerimenti di qualsiasi natura.

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1. disequazioni elementari

1	$sinx > 0$	$2k\pi < x < \pi + 2k\pi$
2	$sinx < 0$	$-\pi + 2k\pi < x < 2k\pi$
3	$cosx > 0$	$-\frac{\pi}{2} + 2k\pi < x < \frac{\pi}{2} + 2k\pi$
4	$cosx < 0$	$\frac{\pi}{2} + 2k\pi < x < \frac{3}{2}\pi + 2k\pi$
5	$sinx > -1$	$x \neq \frac{3}{2}\pi + 2k\pi$
6	$sinx < 1$	$x \neq \frac{\pi}{2} + 2k\pi$
7	$cosx > 1$	$\emptyset$
8	$cosx \leq -1$	$x = \pi + 2k\pi$
9	$sinx \geq 1$	$x = \frac{\pi}{2} + 2k\pi$
10	$sinx < -1$	$\emptyset$
11	$cosx \leq 1$	R
12	$cosx > -1$	$x \neq \pi + 2k\pi$

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13	$sinx > \frac{1}{2}$	$\frac{\pi}{6} + 2k\pi < x < \frac{5}{6}\pi + 2k\pi$
14	$cosx > -\frac{1}{2}$	$-\frac{2}{3}\pi + 2k\pi < x < \frac{2}{3}\pi + 2k\pi$
15	$cosx > \frac{\sqrt{3}}{2}$	$-\frac{\pi}{6} + 2k\pi < x < \frac{\pi}{6} + 2k\pi$
16	$sinx < -\frac{\sqrt{2}}{2}$	$\frac{5}{4}\pi + 2k\pi < x < \frac{7}{4}\pi + 2k\pi$
17	$sinx \leq \frac{\sqrt{3}}{2}$	$-\frac{4}{3}\pi + 2k\pi \leq x \leq \frac{\pi}{3} + 2k\pi$
18	$cosx > \frac{\sqrt{2}}{2}$	$-\frac{\pi}{4} + 2k\pi < x < \frac{\pi}{4} + 2k\pi$
19	$cosx \leq \frac{\sqrt{3}}{2}$	$\frac{\pi}{6} + 2k\pi < x < \frac{11}{6}\pi + 2k\pi$
20	$sinx > \frac{\sqrt{2}}{2}$	$\frac{\pi}{4} + 2k\pi < x < \frac{3}{4}\pi + 2k\pi$
21	$tanx > 0$	$k\pi < x < \frac{\pi}{2} + k\pi$
22	$cotx < 0$	$-\frac{\pi}{2} + k\pi < x < k\pi$
23	$tanx < 0$	$\frac{\pi}{2} + k\pi < x < \pi + k\pi$
24	$cotx \geq 0$	$k\pi \leq x \leq \frac{\pi}{2} + k\pi$

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25	$cotx < -\sqrt{3}$	$\frac{5}{6}\pi + k\pi < x < \pi + k\pi$
26	$tanx - \sqrt{3} < 0$	$-\frac{\pi}{2} + k\pi < x < \frac{\pi}{3} + k\pi$
27	$cotx + \sqrt{3} > 0$	$k\pi < x < \frac{5}{6}\pi + 2k\pi$
28	$cotx < -1$	$\frac{3}{4}\pi + k\pi < x < \pi + k\pi$
29	$tanx > \sqrt{3}$	$\frac{\pi}{3} + k\pi < x < \frac{\pi}{2} + k\pi$
30	$tanx > -1$	$-\frac{\pi}{4} + k\pi < x < \frac{\pi}{2} + k\pi$
31	$tanx < \frac{\sqrt{3}}{3}$	$-\frac{\pi}{2} + k\pi < x < \frac{\pi}{6} + k\pi$
32	$2sinx + \sqrt{2} > 0$	$-\frac{\pi}{4} + 2k\pi < x < \frac{5}{4}\pi + 2k\pi$
33	$2cosx + \sqrt{2} > 0$	$-\frac{3}{4}\pi + 2k\pi < x < \frac{3}{4}\pi + 2k\pi$
34	$tanx < -\sqrt{3}$	$-\frac{\pi}{2} + k\pi < x < -\frac{\pi}{3} + k\pi$
35	$tanx < 2 + \sqrt{3}$	$-\frac{\pi}{2} + k\pi < x < \frac{5}{12}\pi + k\pi$
36	$3sinx - 10 > 0$	$\emptyset$

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37	$2cosx + \sqrt{3} \geq 0$	$-\frac{5}{6}\pi + 2k\pi \leq x \leq \frac{5}{6}\pi + 2k\pi$
38	$cotx < -\frac{\sqrt{3}}{3}$	$-\frac{\pi}{3} + k\pi < x < k\pi$
39	$tan2x - 1 < 0$	$-\frac{\pi}{4} + k\frac{\pi}{2} < x < \frac{\pi}{8} + k\frac{\pi}{2}$
40	$sin\left(x + \frac{\pi}{4}\right) > 0$	$-\frac{\pi}{4} + 2k\pi < x < \frac{3}{4}\pi + 2k\pi$
41	$2cos\left(x - \frac{\pi}{3}\right) < 1$	$\frac{2}{3}\pi + 2k\pi < x < \frac{7}{4}\pi + 2k\pi$
42	$cos\left(2x - \frac{\pi}{4}\right) < \frac{\sqrt{2}}{2}$	$\frac{\pi}{4} + k\pi < x < \pi + k\pi$
43	$cotx < \sqrt{5 + 2\sqrt{5}}$	$\frac{\pi}{10} + k\pi < x < \pi + k\pi$
44	$tanx - 2 - \sqrt{3 < 0}$	$-\frac{\pi}{2} + k\pi < x < \frac{5}{12}\pi + k\pi$
45	$cosx < \frac{\sqrt{6} + \sqrt{2}}{4}$	$\frac{\pi}{12} + 2k\pi < x < \frac{23}{12}\pi + 2k\pi$

2. disequazioni di secondo grado

46	$3cos^2x + 1 \leq 0$	$\emptyset$
47	$\sqrt{3}sinx - 2sin^2x \geq 0$	$2k\pi \leq x \leq \frac{\pi}{3} + 2k\pi \vee \frac{2}{3}\pi + 2k\pi \leq x \leq \pi + 2k\pi$

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48	$4sin^2x - 1 > 0$	$\frac{\pi}{6} + k\pi < x < \frac{5}{6}\pi + k\pi$
49	$cos^2x + 2cosx \leq 0$	$\frac{\pi}{2} + 2k\pi \leq x \leq \frac{3}{2}\pi + 2k\pi$
50	$2sin^2x - sinx - 1 \leq 0$	$-\frac{\pi}{6} + 2k\pi \leq x \leq \frac{7}{6}\pi + 2k\pi$
51	$\sqrt{2}sin^2x + sin < 0$	$\pi + 2k\pi < x < \frac{5}{4}\pi + 2k\pi \vee \frac{7}{4}\pi + 2k\pi < x < \pi + 2k\pi$
52	$2cos^2x + 3cosx - 2 < 0$	$\frac{\pi}{3} + 2k\pi < x < \frac{5}{3}\pi + 2k\pi$
53	$tan^2x - tanx > 0$	$\frac{\pi}{4} + k\pi < x < \pi + k\pi \wedge x \neq \frac{\pi}{2} + k\pi$
54	$tan^2x - (1+\sqrt{3})tanx + \sqrt{3} > 0$	$-\frac{\pi}{2} + k\pi < x < \frac{\pi}{4} + k\pi \vee \frac{\pi}{3} + k\pi < x < \frac{\pi}{2} + k\pi$
55	$sin^2x + 3cosx - 3 > 0$	$\emptyset$
56	$cos2x - 2cosx + 1 > 0$	$\frac{\pi}{2} + 2k\pi < x < \frac{3}{2}\pi + 2k\pi$
57	$2cos^2\frac{x}{2} < 1 - 2cosx$	$\frac{\pi}{2} + 2k\pi < x < \frac{3}{2}\pi + 2k\pi$

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58	$2sin^2\frac{x}{2} \leq 1 - 2sinx$	$-\frac{3}{4}\pi + 2k\pi \leq x \leq \frac{\pi}{4} + 2k\pi$
59	$2sin^2x + 5cosx - 4 > 0$	$-\frac{\pi}{3} + 2k\pi < x < \frac{\pi}{3} + 2k\pi$
60	$2sin^2x - \sqrt{2}sinx > 0$	$-\pi + 2k\pi < x < 2k\pi \vee$ $\frac{\pi}{4} + 2k\pi < x < \frac{3}{4}\pi + 2k\pi$
61	$3tan^2x - 1 > 0$	$-\frac{\pi}{6} + k\pi < x < -\frac{\pi}{2} + k\pi \vee$ $-\frac{\pi}{2} + k\pi < x < -\frac{5}{6}\pi + k\pi$
62	$2cos^2x - \sqrt{2}cosx > 0$	$\frac{\pi}{2} + 2k\pi < x < \frac{3}{2}\pi + 2k\pi \vee$ $-\frac{\pi}{4} + 2k\pi < x < \frac{\pi}{4} + 2k\pi$
63	$8cos^2x + 2cosx - 3 < 0$	$-arccos\left(-\frac{3}{4}\right) + 2k\pi < x < -\frac{\pi}{3} + 2k\pi \vee$ $\frac{\pi}{3} + 2k\pi < x < arccos\left(-\frac{3}{4}\right) + 2k\pi$
64	$tan^2x + 2tanx + 3 < 0$	*impossibile*
65	$2cos^2x - sinx - 1 < 0$	$\frac{\pi}{6} + 2k\pi < x < \frac{5}{6}\pi + 2k\pi$
66	$3cot^2x - 4\sqrt{3}cotx + 3 > 0$	$-\frac{2}{3}\pi + k\pi < x < 2\pi + k\pi \vee$ $k\pi < x < \frac{\pi}{6} + k\pi$
67	$tan^2x + (\sqrt{3} + 1)tanx + \sqrt{3} > 0$	$x \neq k\pi \vee x \neq \pm\frac{\pi}{2}$

68	$2cos^2x + \sqrt{3}sinx - 2 > 0$	$2k\pi < x < \frac{\pi}{3} + 2k\pi \vee \frac{2}{3}\pi + 2k\pi < x < (2k+1)\pi$
69	$cos2x + sinx \geq 0$	$-\pi + 2k\pi < x < \frac{1}{6}(12k\pi - 5\pi) \vee -\frac{\pi}{6} + 2k\pi \leq x \leq \pi + 2k\pi$

3. disequazioni lineari in seno e coseno

70	$sinx + cosx \leq 0$	$\frac{3}{4}\pi + 2k\pi \leq x \leq \frac{7}{4}\pi + 2k\pi$
71	$sinx - cosx > 0$	$\frac{\pi}{4} + 2k\pi < x < \frac{5}{4}\pi + 2k\pi$
72	$sinx - cosx \leq 0$	$-\frac{3}{4}\pi + 2k\pi \leq x \leq \frac{\pi}{4} + 2k\pi$
73	$sinx + \sqrt{3}cosx > 0$	$-\frac{\pi}{3} + 2k\pi < x < \frac{2}{3}\pi + 2k\pi$
74	$3sinx - \sqrt{3}cosx > 0$	$-\frac{5}{6}\pi + 2k\pi < x < \frac{\pi}{6} + 2k\pi$
75	$\sqrt{3}sinx + 3cosx > 0$	$-\frac{\pi}{3} + 2k\pi < x < \frac{2}{3}\pi + 2k\pi$
76	$\sqrt{3}sinx + 3cosx - \sqrt{3} > 0$	$-\frac{\pi}{6} + 2k\pi < x < \frac{\pi}{2} + 2k\pi$
77	$\sqrt{3}sinx - cosx - 1 < 0$	$-\pi + 2k\pi < x < \frac{\pi}{3} + 2k\pi$

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78	$cosx + \sqrt{3}sinx - \sqrt{3} > 0$	$\frac{\pi}{6} + 2k\pi < x < \frac{\pi}{2} + 2k\pi$
79	$cosx - sinx + 1 > 0$	$-\pi + 2k\pi < x < \frac{\pi}{2} + 2k\pi$
80	$cosx + sinx - \sqrt{2} \geq 0$	$x = \frac{\pi}{4} + 2k\pi$
81	$cosx + \sqrt{3}sinx - \sqrt{3} \geq 0$	$\frac{\pi}{6} + 2k\pi \leq x \leq \frac{\pi}{2} + 2k\pi$
82	$sin\left(x - \frac{\pi}{3}\right) + cos\left(\frac{4}{3}\pi - x\right) - 1 < 0$	$-\frac{2}{3}\pi + 2k\pi < x < \frac{5}{6}\pi + 2k\pi$
83	$sin2x - cosx + 1 > 2sinx$	$2k\pi < x < \frac{\pi}{6} + 2k\pi \ \vee$ $\frac{5}{6}\pi + 2k\pi < x < 2k\pi$
84	$2cosx - 2sin\left(-x - \frac{2}{3}\pi\right) - 1 < 0$	$-\pi + 2k\pi < x < \frac{\pi}{2} + 2k\pi \ \vee$ $\frac{\pi}{3} + 2k\pi < x < \pi + 2k\pi$

4. disequazioni omogenee di secondo grado in seno e coseno

85	$sin^2x - 3cos^2x \leq 0$	$-\frac{\pi}{3} + k\pi \leq x \leq \frac{\pi}{3} + k\pi$
86	$cos^2x + (\sqrt{3} - 1)sinxcosx - \sqrt{3}sin^2x > 0$	$-\frac{\pi}{6} + k\pi < x < \frac{\pi}{4} + k\pi$
87	$3sin^2x - 2sinxcosx - cos^2x < 0$	$-arctan\frac{1}{3} + k\pi < x < \frac{\pi}{4} + k\pi$

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88	$sin^2x-(\sqrt{3}+1)sinxcosx+\sqrt{3}cos^2x>0$	$-\frac{2}{3}\pi+k\pi<x<\frac{\pi}{4}+k\pi$
89	$sin^2x+4sinxcosx+3cos^2x>0$	$-\frac{\pi}{4}+k\pi<x<\pi-arctan3+k\pi$
90	$2\sqrt{3}cos^2x-2sinxcosx-\sqrt{3}\leq 0$	$\frac{\pi}{6}+k\pi<x<\frac{2}{3}\pi+k\pi$
91	$3cos^2x+2sin2x+2sin^2x>2$	$-arctan\frac{1}{4}+k\pi<x<\frac{\pi}{2}+k\pi$
92	$sin^2x+4sinxcosx+cos^2x<0$	$\frac{\pi}{12}+k\pi<x<\frac{5}{12}\pi+k\pi$
93	$5sin^2x-\sqrt{3}sin2x-cos^2x<2$	$-\frac{\pi}{6}+k\pi<x<\frac{\pi}{3}+k\pi$
94	$3sin^2x+\sqrt{3}sin2x+cos^2x>0$	$R-\left\{\frac{5}{6}\pi+k\pi\right\}$
95	$(3+\sqrt{3})sin^2x+(\sqrt{3}-1)sinxcosx+2cos^2>3$	$\frac{\pi}{6}+k\pi<x<\frac{3}{4}\pi+k\pi$

5. disequazioni di riepilogo

96	$3\,tan\,x>\sqrt{3}$	$-\frac{5}{6}\pi+k\pi<x<-\frac{\pi}{2}+k\pi$
97	$tan\,x\geq-\sqrt{3}$	$-\frac{\pi}{3}+k\pi<x<\frac{\pi}{2}+k\pi$

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98	$2\,sin\,x - \sqrt{3} \geq 0$	$\frac{\pi}{3} + 2k\pi \leq x \leq \frac{2}{3}\pi + 2k\pi$
99	$cos\,x - 2 \geq 0$	*impossibile*
100	$2\,sin\,x + \sqrt{3} > 0$	$-\frac{\pi}{3} + 2k\pi < x < \frac{4}{3}\pi + 2k\pi$
101	$2\,sin^2 x - \left(2 - \sqrt{3}\right) sin\,x - \sqrt{3} \leq 0$	$-\frac{\pi}{3} + 2k\pi \leq x \leq \frac{4}{3}\pi + 2k\pi$
102	$cos^2 x + cos\,x \geq 0$	$-\frac{\pi}{2} + 2k\pi \leq x \leq \frac{\pi}{2} + 2k\pi \vee$ $x = \pi + 2k\pi$
103	$cos^2 x + 1 \leq 0$	*impossibile*
104	$2\,cos^2 x + 3\,cos\,x + 1 > 0$	$-\frac{2}{3}\pi + 2k\pi < x < \frac{2}{3}\pi + 2k\pi$
105	$2\,sin^2 x - sin\,x - 1 > 0$	$-\frac{5}{6}\pi + 2k\pi < x < -\frac{\pi}{6} + 2k\pi$
106	$2\,sin^2 x - 3\,sin\,x + 1 < 0$	$\frac{\pi}{6} + 2k\pi < x < \frac{5}{6}\pi + 2k\pi \wedge$ $x \neq \frac{\pi}{2}$
107	$2\,cos^2 x - 3\,cos\,x + 1 < 0$	$-\frac{\pi}{3} + 2k\pi < x < \frac{\pi}{3} + 2k\pi \wedge$ $x \neq 0$

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108	$cos\,2x + cos\,x < 0$	$\frac{\pi}{3} + 2k\pi < x < \frac{5}{3}\pi + 2k\pi \wedge x \neq \pi$
109	$sin\,x\,cos\,x > 0$	$k\pi < x < \frac{\pi}{2} + k\pi$
110	$4\,sin^2x - 2\sqrt{3}\,sin\,x\,cos\,x - 2\,cos^2x - 1 > 0$	$\frac{\pi}{3} + k\pi < x < \frac{5}{6}\pi + k\pi \wedge x \neq \frac{\pi}{2} + k\pi$
111	$sin^2x + sin\,x\,cos\,x < 0$	$-\frac{\pi}{4} + k\pi < x < k\pi$
112	$\sqrt{3}\,sin\,x - cos\,x \leq 0$	$-\frac{5}{6}\pi + 2k\pi \leq x \leq \frac{\pi}{6} + 2k\pi$
113	$\sqrt{3}\,cos\,x - sin\,x + 1 \geq 0$	$-\frac{5}{6}\pi + 2k\pi \leq x \leq \frac{\pi}{2} + 2k\pi$
114	$sin^4x - cos^4x < 0$	$-\frac{\pi}{4} + k\pi < x < \frac{\pi}{4} + k\pi$
115	$2\,sin^2x + 4\,cos^2x > 5\,cos\,x$	$\frac{\pi}{3} + 2k\pi < x < \frac{5}{3} + 2k\pi$
116	$cos^2x + 2\,cos\,x < 0$	$\frac{\pi}{2} + 2k\pi < x < \frac{3}{2}\pi + 2k\pi$