Equazioni goniometriche

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

Equazioni goniometriche

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1. equazioni elementari

1	$sinx = 0$	$k\pi$
2	$sinx = 1$	$\frac{\pi}{2} + 2k\pi$
3	$sinx = \frac{\sqrt{2}}{2}$	$\frac{\pi}{4} + 2k\pi;\ \frac{3}{4}\pi + 2k\pi$
4	$sinx = \frac{\sqrt{3}}{2}$	$\frac{\pi}{3} + 2k\pi;\ \frac{2}{3}\pi + 2k\pi$
5	$sinx = -\frac{1}{2}$	$\frac{7}{6}\pi + 2k\pi;\ -\frac{\pi}{6} + 2k\pi$
6	$sinx = -\frac{\sqrt{2}}{2}$	$\frac{5}{4}\pi + 2k\pi;\ -\frac{\pi}{4} + 2k\pi$
7	$cosx = 0$	$\frac{\pi}{2} + 2k\frac{\pi}{2}$
8	$cosx = \frac{1}{2}$	$\pm\frac{\pi}{3} + 2k\pi$
9	$cosx = \frac{\sqrt{3}}{2}$	$\pm\frac{\pi}{6} + 2k\pi$
10	$cosx = 1$	$2k\pi$
11	$sinx = \frac{1}{2}$	$\frac{\pi}{6} + 2k\pi\ ;\ \frac{5}{6}\pi + 2k\pi$
12	$cosx = \frac{\sqrt{2}}{2}$	$\pm\frac{\pi}{4} + 2k\pi$

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13	$cosx = -\frac{1}{2}$	$\pm\frac{2}{3}\pi + 2k\pi$
14	$sinx = -1$	$-\frac{\pi}{2} + 2k\pi$
15	$cosx = -1$	$\pi + 2k\pi$
16	$cosx = -\frac{\sqrt{3}}{2}$	$\pm\frac{5}{6}\pi + 2k\pi$
17	$sinx = -\frac{\sqrt{3}}{2}$	$\frac{4}{3}\pi + 2k\pi;\ \frac{5}{3}\pi + 2k\pi$
18	$tanx = 0$	$k\pi$
19	$tanx = \sqrt{3}$	$\frac{\pi}{3} + k\pi$
20	$tanx = \frac{\sqrt{3}}{3}$	$\frac{\pi}{6} + k\pi$
21	$tanx = 1$	$\frac{\pi}{4} + k\pi$
22	$cotx = -\sqrt{3}$	$\frac{5}{6}\pi + k\pi$
23	$cotx = \frac{\sqrt{3}}{3}$	$\frac{\pi}{3} + k\pi$
24	$cotx = 1$	$\frac{\pi}{4} + k\pi$

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25	$cotx = -1$	$-\frac{\pi}{4} + k\pi$
26	$tanx = -1$	$\frac{3}{4}\pi + k\pi$
27	$tanx = -\sqrt{3}$	$\frac{2}{3}\pi + k\pi$
28	$cotx = 0$	$\frac{\pi}{2} + k\pi$
29	$cotx = -\frac{\sqrt{3}}{3}$	$\frac{2}{3}\pi + k\pi$
30	$\lvert sinx \rvert = 1$	$\frac{\pi}{2} + k\pi$
31	$\lvert tanx - 1 \rvert = 0$	$\frac{\pi}{4} + k\pi$
32	$\lvert tanx \rvert = 1$	$\frac{\pi}{4} + k\frac{\pi}{2}$
33	$\lvert cotx \rvert = \sqrt{3}$	$\pm\frac{\pi}{6} + k\pi$
34	$\lvert cosx \rvert = \frac{\sqrt{2}}{2}$	$\frac{\pi}{4} + k\frac{\pi}{2}$
35	$sec\, x = 0$	$impossibile$
36	$sec\, x = 1$	$2k\pi$

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37	$sec\,x = -1$	$\pi + 2k\pi$
38	$sec\,x = \frac{1}{2}$	$impossibile$
39	$csc\,x = 1$	$\frac{\pi}{2} + 2k\pi$
40	$csc\,x = -1$	$\frac{3}{2}\pi + 2k\pi$
41	$csc\,x = 0$	$impossibile$
42	$csc\,x = \frac{\sqrt{3}}{3}$	$impossibile$
43	$csc\,x = 2$	$\frac{\pi}{6} + 2k\pi\ ;\ \frac{5}{6}\pi + 2k\pi$
44	$2cosx + 1 = 0$	$\pm\frac{2}{3}\pi + 2k\pi$
45	$6sinx + 7 = 0$	$impossibile$
46	$3tanx + \sqrt{3} = 0$	$\frac{5}{6}\pi + k\pi$
47	$2cosx - 4 = 3(cosx - 1)$	$\pi + 2k\pi$
48	$2cotx + 2 = 3cotx - \sqrt{3}$	$\frac{\pi}{12} + k\pi$

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49	$2(cotx-1)+\sqrt{3}=1-(3-cotx)$	$\frac{5}{6}\pi+k\pi$
50	$5cosx-3=4(cosx-2)$	$impossibile$
51	$4(sinx-1)+5=2sinx+9+5(sinx-1)$	$\frac{3}{2}\pi+2k\pi$
52	$4\left(tanx-\frac{\sqrt{3}}{4}\right)=3tanx+2$	$\frac{5}{12}\pi+k\pi$
53	$4sin30°\cdot cosx+cos60°=tan135°-sin30°$	$\pi+2k\pi$
54	$2sinx-cos180°=2(\sqrt{5}cos60°-sinx)$	$\frac{\pi}{10}+2k\pi;\ \frac{9}{10}\pi+2k\pi$
55	$3(tanx+1)+2(1-tanx)=2(tanx-1)+8$	$\frac{3}{4}\pi+k\pi$
56	$2(tanx+1)+cos180°(tanx+2)=4tanx-\sqrt{3}sin90°$	$\frac{\pi}{6}+k\pi$
57	$tanx=\frac{1}{5}\sqrt{25-10\sqrt{5}}$	$\frac{\pi}{10}+k\pi$
58	$tanx=-\frac{1}{5}\sqrt{25-10\sqrt{5}}$	$-\frac{\pi}{10}+k\pi$
59	$sec\,x=5$	$x=\pm arccos\frac{1}{5}+2k\pi$

60	$csc\,x = 5$	$arcsin\frac{1}{5} + 2k\pi\,;\pi - arcsin\frac{1}{5} + 2k\pi$

2. equazioni riconducibili ad elementari

61	$sin(2x+1) = \frac{1}{2}$	$\frac{\pi}{12} - \frac{1}{2} + k\pi;\ \frac{5}{12}\pi - \frac{1}{2} + k\pi$
62	$cos(3x-1) = 0$	$\frac{\pi}{6} + \frac{1}{3} + k\frac{\pi}{3}$
63	$cos5x = -\frac{1}{2}$	$\pm\frac{2}{15}\pi + \frac{2}{5}k\pi$
64	$sin3x = -\frac{\sqrt{3}}{2}$	$\frac{4}{9}\pi + \frac{2}{3}k\pi;\ -\frac{\pi}{9} + \frac{2}{3}k\pi$
65	$sin\frac{1}{2}x = -1$	$3\pi + 4k\pi$
66	$cos\frac{1}{3}x = 0$	$\frac{3}{2}\pi + 3k\pi$
67	$2\,cos\,2x = 1$	$\pm\frac{\pi}{6} + k\pi$
68	$cos\left(x + \frac{\pi}{4}\right) = \frac{1}{2}$	$\frac{\pi}{12} + 2k\pi;\ -\frac{7}{12}\pi + 2k\pi$
69	$sin(3x+\pi) = 0$	$k\frac{\pi}{3}$
70	$2cos(x - 45°) = \sqrt{2}$	$k360°;\ 90° + k360°$
71	$2sin\left(3x + \frac{\pi}{3}\right) - \sqrt{3} = 0$	$\frac{2}{3}k\pi;\ \frac{\pi}{9} + \frac{2}{3}k\pi$

72	$cos\left(2x+\frac{\pi}{6}\right)=-\frac{1}{2}$	$\frac{\pi}{4}+k\pi;\ -\frac{5}{12}\pi+k\pi$
73	$sin\left(2x+\frac{\pi}{5}\right)=\frac{1}{2}$	$-\frac{\pi}{60}+k\pi;\ \frac{19}{60}\pi+k\pi$
74	$cos\left(2x+\frac{\pi}{4}\right)=\frac{\sqrt{2}}{2}$	$k\pi;\ -\frac{\pi}{4}+k\pi$
75	$sin\left(x+\frac{\pi}{3}\right)=-1$	$\frac{7}{6}\pi+2k\pi$
76	$cos\frac{1}{2}x=-1$	$2\pi+4k\pi$
77	$cos\left(x-\frac{3}{4}\pi\right)=-\frac{\sqrt{3}}{2}$	$\frac{19}{12}\pi+2k\pi;\ -\frac{\pi}{12}+2k\pi$
78	$cos\left(2x+\frac{\pi}{4}\right)=\frac{\sqrt{2}}{2}$	$k\pi;\ -\frac{\pi}{4}+k\pi$
79	$cos\left(\frac{\pi}{12}-x\right)=1$	$\frac{\pi}{12}+2k\pi$
80	$sin3x=\frac{1}{2}$	$\frac{\pi}{18}+\frac{2}{3}k\pi;\ \frac{5}{19}\pi+\frac{2}{3}k\pi$
81	$2sin2x-\sqrt{3}=0$	$\frac{\pi}{6}+k\pi;\ \frac{\pi}{3}+k\pi$
82	$sin\left(x+\frac{\pi}{4}\right)=0$	$-\frac{\pi}{4}+k\pi$
83	$sin\left(2x-\frac{\pi}{3}\right)=-1$	$\frac{11}{12}\pi+k\pi$

84	$\left\|sin\left(x+\frac{\pi}{3}\right)\right\|=1$	$\frac{\pi}{6}+k\pi$
85	$tan2x=-1$	$\frac{3}{8}\pi+k\frac{\pi}{2}$
86	$tan3x=1$	$\frac{\pi}{12}+k\frac{\pi}{3}$
87	$tan(x-60°)=-\sqrt{3}$	$k180°$
88	$tan\left(2x+\frac{\pi}{3}\right)=-1$	$\frac{5}{24}\pi+k\frac{\pi}{2}$
89	$cot(30°+2x)=\sqrt{3}$	$k90°$
90	$tan\left(\frac{2}{3}x+\frac{\pi}{2}\right)=-\frac{\sqrt{3}}{3}$	$\frac{\pi}{2}+\frac{3}{2}k\pi$
91	$cot\left(x+\frac{2}{3}\pi\right)=-\sqrt{3}$	$\frac{\pi}{6}+k\pi$
92	$cot\left(2x+\frac{\pi}{18}\right)=0$	$\frac{2}{9}\pi+k\frac{\pi}{2}$
93	$cot\left(3x+\frac{\pi}{4}\right)=-1$	$-\frac{\pi}{6}+k\frac{\pi}{3}$
94	$\sqrt{6}\,cot\left(\frac{3}{5}x-\frac{\pi}{6}\right)=\sqrt{2}$	$\frac{5}{6}\pi+\frac{5}{3}k\pi$
95	$cot\left(\frac{2}{3}x+\frac{\pi}{5}\right)=-\sqrt{3}$	$\frac{19}{20}\pi+\frac{3}{2}k\pi$

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96	$tan\left(x-\frac{\pi}{4}\right)=1$	$\frac{\pi}{2}+k\pi$
97	$cot\left(2x+\frac{\pi}{18}\right)=0$	$\frac{2}{9}\pi+k\frac{\pi}{2}$
98	$tan\left(3x+\frac{\pi}{6}\right)=-1$	$\frac{7}{36}\pi+k\frac{\pi}{3}$
99	$cot\left(x+\frac{2}{3}\pi\right)=-\sqrt{3}$	$\frac{\pi}{6}+k\pi$
100	$tan\left(x+\frac{\pi}{3}\right)=0$	$-\frac{\pi}{3}+k\pi$
101	$tan\frac{3}{10}\pi+2k\pi=1$	$\frac{9}{20}\pi+k\pi$
102	$sin\left(2x-\frac{\pi}{3}\right)=sin\left(x+\frac{2}{3}\pi\right)$	$\pi+2k\pi;\ \frac{2}{9}\pi+\frac{2}{3}k\pi$
103	$sin\left(3x-\frac{\pi}{5}\right)=-sin\left(x+\frac{\pi}{4}\right)$	$-\frac{\pi}{80}+k\frac{\pi}{2};\ \frac{29}{40}\pi+k\pi$
104	$cos\left(-x+\frac{3}{4}\pi\right)=cos\left(2x-\frac{\pi}{5}\right)$	$\frac{19}{60}\pi-\frac{2}{3}k\pi;\ -\frac{11}{20}\pi+2k\pi$
105	$cos(2x-50°)=cos(10°-x)$	$20°+k120°;\ 40°+k360°$
106	$cos(3x-15°)=-cos(2x-5°)$	$40°+k72°;\ -170°+k360°$
107	$sin(2x-30°)=cos(-x+15°)$	$105°+k360°;\ 45°+k120°$
108	$sinx=sin(x-60°)$	$120°+k180°$

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109	$sin7x = cos5x$	$\frac{\pi}{24} + k\frac{\pi}{6};\ \ \frac{\pi}{4} + k\pi$
110	$sin5x = -cos2x$	$-30° + k120°;\ \ -\frac{90°}{7} + k\frac{360°}{7}$
111	$sin3x = cos2x$	$18° - k72°;\ \ 90° - k360°$
112	$cos2x - cosx = 0$	$\frac{2}{3}k\pi$
113	$cos3x = cos2x$	$\frac{2}{5}k\pi$
114	$cos\left(2x - \frac{\pi}{10}\right) = cos\left(x - \frac{\pi}{5}\right)$	$-\frac{3}{10}\pi + 2k\pi;\ \ \frac{\pi}{30} + \frac{2}{3}k\pi$
115	$cos\left(x - \frac{3}{4}\pi\right) = cos\left(x - \frac{\pi}{12}\right)$	$-\frac{\pi}{3} + k\pi$
116	$tan\left(2x - \frac{\pi}{6}\right) = tan\left(x + \frac{\pi}{3}\right)$	$\frac{\pi}{2} + k\pi$
117	$tanx = -cot3x$	$-\frac{\pi}{4} + k\frac{\pi}{2}$
118	$tan(11x + 15°) = cot(54° - 8x)$	$7° + k60°$
119	$tan(2x - 18°) = tan(x + 12°)$	$30° + k180°$
120	$tan(3x - 15°) = -tan(2x - 25°)$	$8° + k36°$
121	$cot(-x) = -cot\left(2x - \frac{\pi}{12}\right)$	$\frac{\pi}{12} - k\pi$

122	$tan(4x - 55°) = cot(2x + 55°)$	$15° + k30°$
123	$tan\left(2x - \frac{\pi}{18}\right) = cot\left(x + \frac{\pi}{3}\right)$	$\frac{1}{27}\pi + k\frac{\pi}{3}$
124	$cos\left(\frac{\pi}{5} - x\right) + sin\left(\frac{3}{10}\pi + x\right) = 0$	$-\frac{3}{10}\pi - k\pi$
125	$2cot\left(\frac{\pi}{2} - x\right) + tan(\pi - x) = cot\left(\frac{3}{2}\pi - 2x\right)$	$-k\pi$
126	$sin\left(x - \frac{\pi}{3}\right) = sin2x$	$-\frac{\pi}{3} + 2k\pi;\ \frac{4}{9}\pi + \frac{2}{3}k\pi$
127	$sin\left(3x + \frac{\pi}{12}\right) = sinx$	$-\frac{\pi}{24} + k\pi;\ \frac{11}{48}\pi + k\frac{\pi}{2}$
128	$sin\left(\frac{\pi}{4} - x\right) = sin\left(2x + \frac{\pi}{4}\right)$	$\frac{2}{3}k\pi;\ \frac{\pi}{2} + 2k\pi$
129	$sin\left(2x + \frac{\pi}{4}\right) = sin3x$	$\frac{\pi}{4} + 2k\pi;\ \frac{3}{20}\pi + \frac{2}{5}k\pi$
130	$cos\left(2x - \frac{\pi}{12}\right) = cos\left(x + \frac{\pi}{3}\right)$	$\frac{5}{12}\pi + 2k\pi;\ -\frac{\pi}{12} + \frac{2}{3}k\pi$
131	$tan2x = tan\left(x + \frac{\pi}{4}\right)$	*impossibile*
132	$tan\left(x - \frac{\pi}{6}\right) = tan\left(\frac{4}{3}\pi - x\right)$	$\frac{3}{4}\pi + k\frac{\pi}{2}$
133	$cot\left(4x + \frac{\pi}{5}\right) = cot\left(3x - \frac{\pi}{6}\right)$	$-\frac{11}{30}\pi + k\pi$
134	$cot\left(x + \frac{7}{6}\pi\right) = cot\left(\frac{5}{3}\pi - x\right)$	$\frac{\pi}{4} + k\frac{\pi}{2}$

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135	$tan\left(x+\frac{\pi}{3}\right)+cot\left(\frac{\pi}{6}-x\right)=2$	$-\frac{\pi}{12}+k\pi$
136	$sin\left(\frac{\pi}{3}-x\right)+cos\left(\frac{\pi}{6}+x\right)=1$	$\frac{\pi}{6}+2k\pi;\ -\frac{\pi}{2}+2k\pi$
137	$tan2x+tanx=0$	$k\frac{\pi}{3}$
138	$tan\left(x-\frac{\pi}{6}\right)+tanx=0$	$\frac{\pi}{12}+k\frac{\pi}{2}$
139	$sin\left(2x-\frac{\pi}{3}\right)=sin\left(\frac{\pi}{4}-3x\right)$	$\frac{7}{60}\pi+k\frac{2}{5}\pi;\ -\frac{13}{12}\pi+2k\pi$
140	$cos\left(\frac{\pi}{2}+x\right)=cosx$	$-\frac{\pi}{4}+k\pi$
141	$\tan(2x-\pi)=\tan\frac{x}{2}$	$\frac{2}{3}\pi+k\frac{2}{3}\pi$
142	$cot(2x-\pi)=cot\left(x+\frac{\pi}{3}\right)$	$\frac{4}{3}\pi+k\pi$
143	$sin(2x-\pi)=cosx$	$\frac{\pi}{2}+k\pi;\ -\frac{\pi}{6}+2k\pi;\ \frac{7}{6}\pi+2k\pi$
144	$cosx=-sinx$	$-\frac{\pi}{4}+k\pi$
145	$tan\left(2x-\frac{\pi}{6}\right)=cot\left(\frac{\pi}{6}-x\right)$	$\frac{\pi}{2}+k\pi$
146	$cot\left(\frac{\pi}{2}-3x\right)=-tan\left(x+\frac{\pi}{3}\right)$	$-\frac{\pi}{12}+k\frac{\pi}{4}$

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3. equazioni di secondo grado

147	$sin^2x - sinx = 0$	$k\pi;\ \frac{\pi}{2} + 2k\pi$
148	$2sin^2x - 1 = 0$	$\frac{\pi}{4} + k\frac{\pi}{2}$
149	$2sin^2x + \sqrt{3}sinx = 0$	$k\pi;\ -\frac{\pi}{3} + 2k\pi;\ -\frac{2}{3}\pi + 2k\pi$
150	$cos^2x + cosx = 0$	$\frac{\pi}{2} + k\pi;\ \pi + 2k\pi$
151	$cos^2x - cosx = 0$	$\frac{\pi}{2} + k\pi;\ 2k\pi$
152	$tan^2x + tanx = 0$	$k\pi;\ \frac{3}{4}\pi + k\pi$
153	$2cos^2x + \sqrt{3}cosx = 0$	$\pm\frac{5}{6}\pi + 2k\pi;\ \frac{\pi}{2} + k\pi$
154	$4cos^2 2x - 3 = 0$	$\pm\frac{\pi}{12} + k\pi;\ \pm\frac{5}{12}\pi + k\pi$
155	$2cos^2x - 5cosx + 2 = 0$	$\pm\frac{\pi}{3} + 2k\pi$
156	$2sin^2x - 7sinx + 3 = 0$	$\frac{\pi}{6} + 2k\pi;\ \frac{5}{6}\pi + 2k\pi$
157	$2cos^2x - 3cosx + 1 = 0$	$2k\pi;\ \pm\frac{\pi}{3} + 2k\pi$
158	$2sin^2x + 3sinx + 1 = 0$	$\frac{3}{2}\pi + 2k\pi;\ \frac{7}{6}\pi + 2k\pi;\ \frac{11}{6}\pi + 2k\pi$
159	$4sin^2\frac{x}{2} + 3sin\frac{x}{2} + 1 = 0$	$\frac{\pi}{3} + 4k\pi;\ \frac{5}{3}\pi + 4k\pi$

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160	$tan^2x-(\sqrt{3}+1)tanx+\sqrt{3}=0$	$\frac{\pi}{3}+k\pi;\ \frac{\pi}{4}+k\pi$
161	$4sin^2x-1=0$	$\pm\frac{\pi}{6}+k\pi$
162	$3tan^2x-1=0$	$\pm\frac{\pi}{6}+k\pi$
163	$tan^2x-\sqrt{3}tanx=0$	$k\pi;\ \frac{\pi}{3}+k\pi$
164	$tan^2x-2tanx+1=0$	$\frac{\pi}{4}+k\pi$
165	$cot^2x+(1-\sqrt{3})cotx-\sqrt{3}=0$	$\frac{\pi}{6}+k\pi;\ \frac{3}{4}\pi+k\pi$
166	$2sin^2x+sinx-1=0$	$\frac{\pi}{6}+2k\pi;\ \frac{5}{6}\pi+2k\pi;\ \frac{3}{2}\pi+2k\pi$
167	$2cos^2x-3cosx+1=0$	$\pm\frac{\pi}{3}+2k\pi;\ 2k\pi$
168	$tan^2x+(1-\sqrt{3})tanx-\sqrt{3}=0$	$-\frac{\pi}{4}+k\pi;\ \frac{\pi}{3}+k\pi$
169	$cot^2x-2cotx+1=0$	$\frac{\pi}{4}+k\pi$
170	$sin^2x-1=0$	$\frac{\pi}{2}+k\pi$
171	$4cos^2x-3=0$	$\pm\frac{\pi}{6}+2k\pi;\ \pm\frac{5}{6}\pi+2k\pi$
172	$tan^2x-1=0$	$\frac{\pi}{4}+k\frac{\pi}{2}$
173	$3cot^2x-1=0$	$\pm\frac{\pi}{3}+k\pi$

174	$2sin^2x - \sqrt{2}sinx = 0$	$\frac{\pi}{4} + 2k\pi;\ \frac{3}{4}\pi + 2k\pi;\ k\pi$
175	$cos^2x - \frac{\sqrt{2}}{2}cosx = 0$	$\frac{\pi}{4} + k\pi;\ \frac{\pi}{2} + k\pi$
176	$tan^2x + tanx = 0$	$k\pi;\ -\frac{\pi}{4} + k\pi$
177	$cot^2x + cotx = 0$	$\frac{\pi}{2} + k\pi;\ -\frac{\pi}{4} + k\pi$

4. equazioni lineari in seno e coseno

178	$sinx - cosx = 0$	$\frac{\pi}{4} + k\pi$
179	$sinx + cosx = 0$	$-\frac{\pi}{4} + k\pi$
180	$3sinx - \sqrt{3}cosx = 0$	$\frac{\pi}{6} + k\pi$
181	$sinx + \sqrt{3}cosx = 0$	$-\frac{\pi}{3} + k\pi$
182	$sinx - (2 + \sqrt{3})cosx = 0$	$\frac{5}{12}\pi + k\pi$
183	$\sqrt{3}sinx + 3cosx = 0$	$-\frac{\pi}{3} + k\pi$
184	$\sqrt{3}\ sinx + 3\ cosx = 0$	$60° + k180°$
185	$sin\frac{3}{2}x - cos\frac{3}{2}x = 1$	$\frac{4}{3}k\pi;\ -\frac{\pi}{3} + \frac{4}{3}k\pi$
186	$cosx + sinx + \sqrt{2} = 0$	$\frac{5}{4}\pi + 2k\pi$

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187	$\sqrt{3}cosx + sinx = 2$	$\frac{\pi}{6} + 2k\pi$
188	$\sqrt{3}cosx + sinx = \sqrt{3}$	$k360°;\ 60° + k360°$
189	$sinx - cosx + 1 = 0$	$k360°;\ 270° + k360°$
190	$sinx + cosx + 1 = 0$	$180° + k360°;\ 270° + k360°$
191	$sinx + cosx = \frac{\sqrt{2}}{2}$	$105° + k360°;\ 345° + k360°$
192	$sinx - cosx = \frac{\sqrt{2}}{2}$	$45° + (-1)^k 30° + k180°$
193	$sin3x + cos3x = \sqrt{2}$	$15° + k120°$
194	$sinx - \sqrt{3}\,cosx = 2$	$150° + k360°$
195	$\sqrt{3}sinx + cosx + 1 = 0$	$\pi + 2k\pi;\ -\frac{\pi}{3} + 2k\pi$
196	$sinx - cosx - 1 = 0$	$\pi + 2k\pi;\ \frac{\pi}{2} + 2k\pi$
197	$3sinx + \sqrt{3}cosx + \sqrt{3} = 0$	$\pi + 2k\pi;\ -\frac{\pi}{3} + 2k\pi$
198	$2cosx + 2sinx - (\sqrt{3} + 1) = 0$	$\frac{\pi}{3} + 2k\pi;\ \frac{\pi}{6} + 2k\pi$
199	$cos(90° - x) + sin(120° - x) = \sqrt{3}$	$60° + k360°$
200	$sin\left(\frac{5}{6}\pi - x\right) - cos\left(\frac{4}{3}\pi - x\right) = 2$	$\frac{\pi}{3} + 2k\pi$

201	$cosx + \sqrt{3}\, sinx = 2$	$\frac{\pi}{3} + 2k\pi$
202	$sinx + cosx = \frac{1}{2}(\sqrt{3} + 1)$	$\frac{\pi}{6} + 2k\pi;\ \frac{\pi}{3} + 2k\pi$
203	$cos\left(x - \frac{\pi}{2}\right) + sin\left(x - \frac{3}{2}\pi\right) = \sqrt{2}$	$\frac{\pi}{4} + 2k\pi$
204	$sinx - cosx - \sqrt{2} = 0$	$\frac{3}{4}\pi + 2k\pi$
205	$\frac{\sqrt{3}}{2}\left(cos^2\frac{x}{2} - \frac{1 - cosx}{2}\right) + \frac{1}{2}sinx = 1$	$\frac{\pi}{6} + 2k\pi$
206	$\sqrt{3}\, sin4x + cos4x = 2$	$\frac{\pi}{12} + k\frac{\pi}{4}$
207	$2sin(x - 90°) - cos(120° + x) = 0$	$60° + k180°$
208	$cos2x + \sqrt{3}\, sin2x = 2$	$\frac{\pi}{6} + k\pi$
209	$\sqrt{3}cos\left(\frac{3}{2}\pi + x\right) + cos(x - \pi) = 2$	$\frac{2}{3}\pi + 2k\pi$
210	$sin\left(\frac{5}{6}\pi - x\right) - cos\left(\frac{4}{3}\pi - x\right) = 2$	$\frac{\pi}{3} + 2k\pi$

5. equazioni omogenee in seno e coseno

211	$\sqrt{3}cos^2x + sinx\, cosx = 0$	$\pm\frac{\pi}{2} + 2k\pi;\ -\frac{\pi}{3} + k\pi$
212	$3cos^2x + \sqrt{3}sinx\, cosx = 0$	$\frac{\pi}{2} + k\pi;\ \frac{2}{3}\pi + k\pi$
213	$sin^2x - 3cos^2x = 0$	$\pm\frac{\pi}{3} + k\pi$

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214	$4sin^2x - 9cos^2x = 0$	$\pm arctan\frac{3}{2} + k\pi$
215	$\sqrt{3}sin^2x - sinx\ cosx = 0$	$k\pi;\ \frac{\pi}{6} + k\pi$
216	$sin^2x + (\sqrt{3} - 2)sinx\ cosx = 0$	$k\pi;\ \frac{\pi}{12} + k\pi$
217	$2sinx\ cosx - 1 = 0$	$\frac{\pi}{4} + k\pi$
218	$4sinx\ cosx - 1 = 0$	$\frac{\pi}{12} + k\pi;\ \frac{5\pi}{12} + k\pi$
219	$2sinx\ cosx = cos^2x - sin^2x$	$22°30' + k90°$
220	$3sin^2x - 2\sqrt{3}sinx\ cosx - 3cos^2x = -2\sqrt{3}$	$\frac{\pi}{12} + k\pi$
221	$sin^2x + \frac{3}{4}cos^2x + \frac{1}{4}sin^2x = \frac{\sqrt{3}}{2}sinx\ cosx + \frac{1}{2}$	$\frac{\pi}{6} + k\pi$
222	$5sin^2x - 2\sqrt{3}cosx\ sinx - cos^2x - 2 = 0$	$\frac{\pi}{3} + k\pi;\ \frac{5}{6}\pi + k\pi$
223	$sin^2x - 7cos^2x + 2\sqrt{2}sinx\ cosx = 4$	$\frac{\pi}{3} + k\pi;\ \frac{5}{6}\pi + k\pi$
224	$6sin^2x - 8sinx\ cosx + 4cos^2x - 1 = 0$	$\frac{\pi}{4} + k\pi;\ arctan\frac{3}{5} + k\pi$
225	$2sin^2x + \sqrt{3}sinx\ cosx - cos^2x - 2 = 0$	$\pm\frac{\pi}{2} + 2k\pi;\ \frac{\pi}{3} + k\pi$

226	$2cos^2x + 2cosx\ sinx = \frac{\sqrt{3}+3}{2}$	$\frac{\pi}{6} + k\pi;\ \frac{\pi}{12} + k\pi$
227	$2\sqrt{3}sinx\left(\frac{\sqrt{3}}{2}cosx - \frac{1}{2}sinx\right) + \frac{\sqrt{3}}{2} = \sqrt{3}$	$\frac{\pi}{6} + k\pi$
228	$\frac{\sqrt{3}}{3}cos^2x + sinx\ cosx = \frac{\sqrt{3}}{3}$	$\frac{\pi}{3} + k\pi;\ k\pi$
229	$\sqrt{3}sin^2x - 2sinx\ cosx - \sqrt{3}cos^2x = 0$	$-\frac{\pi}{6} + k\pi;\ \frac{\pi}{3} + k\pi$
230	$3sin^2x - 8\sqrt{3}sinx\ cosx + 15cos^2x = 0$	$\frac{\pi}{3} + k\pi;\ arctan\frac{5\sqrt{3}}{3}$
231	$3sin^4x - 4sin^2x\ cos^2x + cos^4x = 0$	$\pm\frac{\pi}{4} + k\pi;\ \pm\frac{\pi}{6} + k\pi$
232	$4sin^2x\ cos^2x - 4cos^4x = 0$	$\frac{\pi}{2} + k\pi;\ \frac{\pi}{4} + k\frac{\pi}{2}$

6. equazioni simmetriche

233	$sinx + cosx = 1$	$2k\pi;\ \frac{\pi}{2} + 2k\pi$
234	$sinx + cosx + 2sinx\ cosx + 1 = 0$	$-\frac{\pi}{2} + 2k\pi;\ -\frac{\pi}{4} + k\pi$
235	$sinx + cosx + 2sinx\ cosx - (1+\sqrt{2}) = 0$	$\frac{\pi}{4} + 2k\pi$
236	$sin^3x + cos^3x = 0$	$-\frac{\pi}{4} + k\pi$

7. equazioni risolubili mediante le formule goniometriche

237	$cos\left(\frac{\pi}{6} + x\right) + cos\left(\frac{\pi}{6} - x\right) - \frac{3}{2} = 0$	$\pm\frac{\pi}{6} + 2k\pi$

238	$2sin\left(x-\frac{\pi}{4}\right)+2sin\left(x+\frac{\pi}{4}\right)=\sqrt{2}$	$\frac{\pi}{6}+2k\pi;\ \frac{5}{6}\pi+2k\pi$
239	$tan\left(\frac{\pi}{6}+x\right)+tan\left(\frac{\pi}{3}-x\right)=2$	$\frac{\pi}{12}+k\pi$
240	$2sin2x-tanx=0$	$k\pi;\ \pm\frac{\pi}{3}+2k\pi;\ \pm\frac{2}{3}\pi+2k\pi$
241	$sin2x-sinx=0$	$k\pi;\ \pm\frac{\pi}{3}+2k\pi$
242	$\sqrt{3}cosx-cos2x-1=0$	$\frac{\pi}{2}+k\pi;\ \pm\frac{\pi}{6}+2k\pi$
243	$cotx-sin2x=0$	$\frac{\pi}{2}+k\pi;\ \frac{\pi}{4}+k\frac{\pi}{2}$
244	$tan^2\frac{x}{2}+2cosx-\frac{4}{3}=0$	$\pm\frac{\pi}{3}+2k\pi$
245	$cos^2\frac{x}{2}-sin^2\frac{x}{2}-\sqrt{2}cos^2x=0$	$\frac{\pi}{2}+k\pi;\ \frac{\pi}{4}+k\pi$
246	$tan^2\frac{x}{2}=4sin^2\frac{x}{2}$	$2k\pi;\ \pm\frac{2\pi}{3}+2k\pi$
247	$\frac{1-cosx}{1+cosx}=4sin^2\frac{x}{2}$	$2k\pi;\ \pm\frac{2}{3}\pi+2k\pi$
248	$sin6x-sin4x=2sinx$	$k\pi;\ k\frac{2}{5}\pi$
249	$sin3x-sinx=cos3x$	$\pm\frac{\pi}{6}+\frac{2}{3}k\pi;\ \frac{\pi}{12}+k\pi;\ \frac{5\pi}{12}+k\pi$
250	$sinx\ cos3x=sin2x\ cos4x$	$k\pi;\ \frac{\pi}{10}+k\frac{\pi}{5}$

251	$sinx\ sin2x = sin3x\ sin4x$	$k\frac{\pi}{2};\ k\frac{\pi}{5}$

8. equazioni con funzioni goniometriche inverse impegnative

252	$sin\left(arccos\left(x+\frac{\pi}{4}\right)\right) = cos\ \frac{\pi}{3}$	$-\frac{\pi\ \pm\ 2\sqrt{3}}{4}$
253	$cos\left(arcsin\,x+\frac{\pi}{3}\right) = x$	$\frac{\sqrt{6}-\sqrt{2}}{4}$
254	$tan(arcsin\,x - arccos\,x) = \frac{1}{x}$	*impossibile*
255	$tan\left(arcsin\sqrt{x}\right) = sin(arctan\,x)$	0
256	$sin\left(arcsin\,x+\frac{\pi}{6}\right) = \frac{x\ tan\frac{\pi}{4}}{2}$	$-\frac{1}{\sqrt{5-2\sqrt{3}}}$
257	$cos\left(\frac{\pi}{4}+arctan\sqrt{x}\right) = 1$	*impossibile*
258	$tan(arcsin\,5x)\,tan(arccos\,5x) = 1$	$\left(-\frac{1}{5},0\right)\cup\left(0,\frac{1}{5}\right)$
259	$sin(2\,arccos\,x) = cos(2\,arcsin\,x)$	$-\frac{\sqrt{2+\sqrt{2}}}{2};\quad\frac{\sqrt{2-\sqrt{2}}}{2}$
260	$tan\left(arccos(sin^2x)+\frac{\pi}{2}\right) = -sin^2x$	$k\pi$
261	$sin(arccos(1-x)+arcsin(1+x)) = k$	*impossibile*
262	$sin\left(arccos\left(x-\frac{1}{2}\right)-arcsin\left(x+\frac{1}{2}\right)\right) = \frac{3}{4}$	$\pm\frac{\sqrt{70}}{28}$
263	$sin(arctan(sin\,x)-arccos\,(sin\,x)) = \frac{1}{\sqrt{1+sin^2x}}$	$\frac{\pi}{2}+k\pi$

264	$cos\left(arcsin\sqrt{1+x}+\frac{\pi}{4}\right)=\frac{\sqrt{-2x}}{2}$	-1
265	$x\,tan(2\,arctan\,x)+x^2=-1-\frac{5}{2\sqrt{3}}$	$\pm\frac{1+\sqrt{3}}{\sqrt{2}}$
266	$sin\left(2\,arccos\sqrt{x-2}\right)=tan\frac{x}{2}sin\,x+cos\,x$	$\frac{5}{2}$
267	$cos\left(\frac{\pi}{3}+2\,arcsin\frac{x}{13}\right)=\sqrt{1-\frac{x^2}{169}}-\frac{x^2}{338}$	$3-4\sqrt{3}$
268	$tan(arctan\,x+arctan\,3x)=2\,tan(arctan\,x+arctan\,2x)$	$0;\ \pm\frac{\sqrt{5}}{5}$
269	$2\,sin(arcsin\,x+arcsin\,3x)=3(arcsin\,x+arcsin\,2x)$	0
270	$6\,cos(arccos\,2x+arccos\,5x)=5\,cos(arccos\,3x+arccos\,4x)$	$\pm\frac{\sqrt{4609}}{419}$
271	$tan^2(arcsin\,x)+tan^2(arccos\,x)=3$	$\pm\frac{\sqrt{5-\sqrt{5}}}{\sqrt{10}};\ \pm\frac{\sqrt{5+\sqrt{5}}}{\sqrt{10}}$

9. equazioni di riepilogo

272	$2cosx-5=0$	*impossibile*
273	$sin^2x+\left(1-\sqrt{3}\right)sinx\,cosx-\sqrt{3}cos^2x=0$	$-\frac{\pi}{4}+k\pi;\ \frac{\pi}{3}+k\pi$
274	$3sin^2x+7sinx=0$	$k\pi$
275	$cosx=-cos2x$	$\frac{\pi}{3}+\frac{2}{3}k\pi$
276	$\sqrt{3}sinx+cosx=1$	$2k\pi;\ \frac{2}{3}\pi+2k\pi$

Equazioni goniometriche

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277	$\sqrt{3}sinx\ cosx - cos^2x = 0$	$\frac{\pi}{2} + k\pi;\ \frac{\pi}{6} + k\pi$
278	$cosx + \sqrt{3}sinx = -1$	$\pi + 2k\pi;\ -\frac{\pi}{3} + 2k\pi$
279	$5sin^2x - 3sinx\ cosx - 2cos^2x = 0$	$\frac{\pi}{4} + k\pi;\ -arctan\frac{2}{5} + k\pi$
280	$3tan^2x + 2\sqrt{3}tanx - 3 = 0$	$-\frac{\pi}{3} + k\pi;\ \frac{\pi}{6} + k\pi$
281	$sinx - \sqrt{3}cosx = 0$	$\frac{\pi}{3} + k\pi$
282	$sin^2x + cos2x = 1$	$k\pi$
283	$sin3x = sin\left(\frac{2\pi}{3} + x\right)$	$\frac{\pi}{3} + k\pi;\ \frac{\pi}{12} + \frac{\pi}{2}k$
284	$sin\left(x + \frac{\pi}{6}\right) - 2cosx = 0$	$\frac{\pi}{3} + k\pi$
285	$sin3x + sinx = 0$	$k\frac{\pi}{2}$
286	$tan\left(x - \frac{\pi}{3}\right) = cot\left(x + \frac{\pi}{3}\right)$	$\frac{\pi}{4} + k\frac{\pi}{2}$
287	$cosx - 2sinx\ cosx - sinx + 2sin^2x = 0$	$\frac{\pi}{6} + 2k\pi;\ -\frac{\pi}{6} + 2k\pi;\ \pm\frac{\pi}{4} + 2k\pi$
288	$sin^4x - sin^2x\ cos^2x - sin^2x + cos^2x = 0$	$\pm\frac{\pi}{4} + 2k\pi;\ \frac{\pi}{2} + k\pi$
289	$4sin^2x + cos^2x - 7 = 0$	*impossibile*
290	$2sin^2\frac{x}{2} - sin2x + cosx = 0$	$\frac{\pi}{4} + k\pi$

Equazioni goniometriche

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291	$sinx - cosx + 1 = 2sinx\ cosx$	$2k\pi;\ \frac{\pi}{4} + k\pi;\ -\frac{\pi}{2} + 2k\pi$
292	$tan2x - 3tanx = 0$	$k\pi;\ \pm\frac{\pi}{6} + k\pi$
293	$sinx - tan\frac{x}{2} - cosx = 0$	$\pm\frac{\pi}{2} + 2k\pi$
294	$tan2x - 2\sqrt{3}cos2x = 0$	$\frac{\pi}{6} + k\pi;\ \frac{\pi}{3} + k\pi$
295	$2sinx + tanx - 1 = 2cosx$	$\pm\frac{2}{3}\pi + 2k\pi;\ \frac{\pi}{4} + k\pi$
296	$2sin\left(\frac{\pi}{3} + x\right) - \sqrt{3}cosx + 1 = 0$	$\frac{3}{2}\pi + 2k\pi$
297	$sin2x = 2cosx$	$\frac{\pi}{2} + k\pi$
298	$cos8x + cos4x = 2cos6x$	$k\pi;\ \frac{\pi}{12} + k\frac{\pi}{6}$
299	$sin\left(x + \frac{\pi}{6}\right) - sin\left(x - \frac{\pi}{6}\right) = \sqrt{3}sin\frac{\pi}{6}$	$\pm\frac{\pi}{6} + 2k\pi$
300	$cos\left(\frac{\pi}{4} - x\right) + cos\left(\frac{\pi}{4} + x\right) - \frac{\sqrt{6}}{2} = 0$	$\pm\frac{\pi}{6} + 2k\pi$
301	$3sinx\ cosx - \sqrt{3}cos^2x - 3sinx + \sqrt{3}cosx = 0$	$2k\pi;\ \frac{\pi}{6} + k\pi$
302	$tan3x - tanx = secx \cdot sin2x$	$k\pi;\ \pm\frac{2}{3}\pi + 2k\pi$

303	$4\,cos^2x + 5\,cos\,x - 2 = 0$	$\pm arccos\left(\frac{-5+\sqrt{57}}{8}\right) + 2k\pi$
304	$3\,tan^2x - 4\,tan\,x + 3 = 0$	*impossibile*
305	$5\,sin^2x + \sqrt{3}\,sin\,x\,cos\,x - 2 = 0$	$arctan\left(-\frac{2\sqrt{3}}{3}\right) + k\pi;\ \frac{1}{6}\pi + k\pi$
306	$\sqrt{2}\,sin\,2x + sin^2x + 1 = 0$	$arctan(\sqrt{2}-\sqrt{3}) + 2k\pi;$ $arctan(\sqrt{2}+\sqrt{3}) + 2k\pi$
307	$2\,sin\,2x + \sqrt{5}\,sin\,x = 0$	$k\pi;\ \pm arccos\left(-\frac{\sqrt{5}}{4}\right) + 2k\pi$
308	$sin\,x + \sqrt{5}\,cos\,x - 3 = 0$	*impossibile*
309	$sinx(tanx - \sqrt{3}) = 0$	$k\pi;\ \frac{\pi}{3} + k\pi$
310	$3cos^2x + 2sin^2x - tan^2x = \frac{3}{2}$	$\pm\frac{\pi}{4} + k\pi$
311	$tan^2x + 3cot^2x - 4 = 0$	$\pm\frac{\pi}{3} + k\pi;\ \pm\frac{\pi}{4} + k\pi$
312	$\sqrt{2}cscx + 2 = cotx(\sqrt{2} + 2sinx)$	$-\frac{\pi}{4} + 2k\pi;\ \frac{5}{4}\pi + 2k\pi$
313	$tan\left(\frac{\pi}{4} - \frac{x}{2}\right) + sinx = 1$	$2k\pi;\ \frac{\pi}{2} + 2k\pi$
314	$\frac{cosx + cos^2x}{1 + cosx} = 1$	$k\pi$

315	$\frac{sinx}{1-cosx}=\sqrt{3}$	$\frac{\pi}{3}+2k\pi$
316	$2sin^2x+3cosx=3$	$2k\pi;\ \pm\frac{\pi}{3}+2k\pi$
317	$\sqrt{3}\ sin\ x+5\ cos\ x+1=0$	$-2\ arctan\left(\frac{\sqrt{3}}{2}\right)+2k\pi;$ $\frac{2}{3}\pi+2k\pi$
318	$7\ cos^2x+5\ sin\ x+4=0$	$\pi-arcsin\left(\frac{5-3\sqrt{37}}{14}\right)+2k\pi;$ $\left(\frac{5-3\sqrt{37}}{14}\right)+2k\pi$
319	$2\ sin^2x+3\ sinx-1=0$	$\pi-arcsin\left(\frac{-3+\sqrt{17}}{4}\right)+2k\pi;$ $arcsin\left(\frac{-3+\sqrt{17}}{4}\right)+2k\pi$
320	$-2\ cos^2x+4\ sin\ x\ cos\ x+3\ sin^2x=0$	$arctan\left(\frac{-2-\sqrt{10}}{3}\right)+k\pi;$ $arctan\left(\frac{-2+\sqrt{10}}{3}\right)+k\pi$