

risolvi le seguenti equazioni nell'insieme dei numeri reali

## equazioni monomie

1	$x^2 = 0$	$3x^2 = 0$
2	$\frac{5}{7}x^2 = 0$	$\frac{2}{3}x^2 = 0$
3	$4x^2 = 0$	$10x^2 = 0$

## equazioni pure

4	$x^2 - 1 = 0$	$\pm 1$
5	$x^2 - 4 = 0$	$\pm 2$
6	$3x^2 - 27 = 0$	$\pm 3$
7	$x^2 + 1 = 0$	$\nexists x \in R$
8	$9x^2 - 4 = 0$	$\pm \frac{2}{3}$
9	$x^2 + 9 = 0$	$\nexists x \in R$
10	$3x^2 - 1 = 0$	$\pm \frac{\sqrt{3}}{3}$
11	$125x^2 - 5 = 0$	$\pm \frac{1}{5}$
12	$5x^2 + 125 = 0$	$\nexists x \in R$
13	$4 + 124x^2 = 0$	$\nexists x \in R$
14	$7 + 49x^2 = 0$	$\nexists x \in R$

15	$5x^2 = 1$	$\pm \frac{\sqrt{5}}{5}$
16	$7 - 49x^2 = 0$	$\pm \frac{\sqrt{7}}{7}$
17	$7 = -3x^2$	$\nexists x \in R$
18	$\sqrt{3}x^2 + 1 = 0$	$\nexists x \in R$
19	$x^2 - \sqrt{2} = 0$	$\pm \sqrt[4]{2}$
20	$\frac{4}{5}x^2 - 49 = 0$	$\pm \frac{7\sqrt{5}}{2}$
21	$\frac{7}{8}x^2 - 1 = 0$	$\pm \frac{2\sqrt{14}}{7}$
22	$\frac{2}{5}x^2 = \frac{5}{2}$	$\pm \frac{5}{2}$
23	$\frac{3}{2} = \frac{8}{27}x^2$	$\pm \frac{9}{4}$
24	$\frac{1}{2}x^2 - \frac{1}{4} = 0$	$\pm \frac{\sqrt{2}}{2}$
25	$\frac{7}{3}x^2 + \frac{3}{7} = 0$	$\nexists x \in R$
26	$-\frac{1}{3}x^2 + \frac{1}{2} = 0$	$\pm \frac{\sqrt{6}}{2}$
27	$\frac{1}{2}(x^2 + 1) - \frac{4 - x^2}{3} = \frac{6x^2 + 1}{12} - \frac{5}{12}$	$\pm \frac{\sqrt{6}}{2}$
28	$\frac{x^2 + 3x + 2}{10} - \frac{7}{30}x = \frac{x}{3}\left(\frac{1}{5} + \frac{x}{2}\right)$	$\pm \sqrt{3}$

## equazioni spurie

29	$x^2 - x = 0$	0; 1
30	$x^2 + 4x = 0$	-4; 0
31	$5x = 5x^2$	0; 1
32	$2x + x^2 = 0$	-2; 0
33	$5x^2 + 10x = 0$	-2; 0
34	$x - 2x^2 = 0$	0; 2
35	$5x - 3x^2 = 0$	0; $\frac{5}{3}$
36	$3x^2 + 5x = 0$	$-\frac{5}{3}$ ; 0
37	$\frac{7}{9}x^2 - x = 0$	0; $\frac{9}{7}$
38	$x^2 + \frac{2}{3}x = 0$	$-\frac{2}{3}$ ; 0
39	$\frac{81}{4}x^2 - \frac{9}{2}x = 0$	0; $\frac{2}{9}$
40	$\frac{3}{5}x^2 + x = 0$	$-\frac{5}{3}$ ; 0
41	$\frac{9}{4}x^2 - \frac{2}{3}x = 0$	0; $\frac{8}{27}$
42	$\frac{25}{49}x^2 + x = 0$	$-\frac{49}{25}$ ; 0
43	$x^2 = \sqrt{5}x$	0; $\sqrt{5}$

44	$\sqrt{2}x^2 = -2x$	$-\sqrt{2}; 0$
45	$\frac{2}{3}x^2 = \frac{1}{2}x$	$0; \frac{3}{4}$
46	$\frac{3}{7}x^2 - \frac{7}{3}x = 0$	$0; \frac{49}{9}$
47	$\frac{2}{5}x^2 - \frac{5}{2}x = 0$	$0; \frac{25}{4}$
48	$\frac{1}{3}x^2 = \frac{1}{4}x$	$0; \frac{3}{4}$
49	$\frac{x^2}{2} - \frac{x}{3} = 0$	$0; \frac{2}{3}$
50	$\frac{1-3x}{5} + \frac{6}{5} - x - \frac{1+x^2}{15} = \frac{4-x^2}{3}$	$0; 6$
51	$\left(1 - \frac{x}{15}\right)x + \frac{(2-x)(2+x)}{3} = \frac{2}{15} + \frac{3}{5}(2-x)$	$0; 4$

## equazioni complete intere

52	$x^2 - 7x + 10 = 0$	$2; 5$
53	$x^2 + 5x + 6 = 0$	$-3; -2$
54	$x^2 + 2x - 3 = 0$	$-3; 1$
55	$2x^2 + 7x + 3 = 0$	$-3; -\frac{1}{2}$
56	$x^2 + x + 12 = 0$	$\nexists x \in R$

57	$9x^2 + 12x + 4 = 0$	$-\frac{2}{3}; -\frac{2}{3}$
58	$5x^2 - 2x - 16 = 0$	$-\frac{8}{5}; 2$
59	$2x^2 + 5x - 12 = 0$	$-4; \frac{3}{2}$
60	$25x^2 - 20x + 4 = 0$	$\frac{2}{5}; \frac{2}{5}$
61	$x^2 - 5x + 6 = 0$	$2; 3$
62	$x^2 + x - 12 = 0$	$-4; 3$
63	$x^2 + 7x - 8 = 0$	$-8; 1$
64	$9x^2 - 6x + 1 = 0$	$\frac{1}{3}; \frac{1}{3}$
65	$x^2 - x = 20$	$-4; 5$
66	$3x^2 + 5x + 3 = 0$	$\nexists x \in R$
67	$2x^2 = 3x + 2$	$-\frac{1}{2}; 2$
68	$x^2 = x + 2$	$-1; 2$
69	$16x = x^2 + 64$	$8; 8$
70	$9x^2 + 6x + 1 = 0$	$-\frac{1}{3}; -\frac{1}{3}$

71	$10 = 3x^2 + x$	$-2; \frac{5}{3}$
72	$x^2 - 3\sqrt{2}x + 4 = 0$	$\sqrt{2}; 2\sqrt{2}$
73	$3x^2 - x + 1 = 0$	$\nexists x \in R$
74	$4x^2 - 4x - 1 = 0$	$\frac{1 - \sqrt{2}}{2}; \frac{1 + \sqrt{2}}{2}$
75	$x^2 + 4x + 1 = 0$	$-2 - \sqrt{3}; -2 + \sqrt{3}$
76	$x^2 = -x - 2$	$\nexists x \in R$
77	$x^2 - (\sqrt{3} + \sqrt{2})x + \sqrt{6} = 0$	$\sqrt{2}; \sqrt{3}$
78	$(2x + 1)^2 - (x - 3)^2 = 0$	$-4; \frac{2}{3}$
79	$x = (x + 2)^2$	$\nexists x \in R$
80	$x^2 + (\sqrt{2} - \sqrt{3})x - \sqrt{6} = 0$	$-\sqrt{2}; \sqrt{3}$
81	$5x^2 - 2x + \frac{1}{5} = 0$	$\frac{1}{5}; \frac{1}{5}$
82	$\frac{x(x - 2)}{4} = \frac{x + 2}{3}$	$-\frac{2}{3}; 4$
83	$\frac{3}{10}x^2 + \frac{1}{2} - \frac{x}{2} - \frac{3}{2} + \frac{2}{5}x = 0$	$-\frac{5}{3}; 2$
84	$\frac{3}{2}x^2 - 2x + \frac{2}{3} = 0$	$\frac{2}{3}; \frac{2}{3}$

85	$\frac{1}{6}x^2 + \frac{8}{3}x + \frac{32}{3} = 0$	-8; -8
86	$2x^2 - \frac{1}{6}x + 3 = 0$	$\nexists x \in R$
87	$\frac{x^2 + 2}{2} = (x - 2)^2 + \frac{x^2 - 1}{3}$	$\frac{4}{5}; 4$
88	$\frac{1}{3}(3 - x) + \frac{x^2 - 1}{6} - \frac{2}{3} = 0$	1; 1
89	$\frac{1}{3}(3 - x) = \frac{2}{3} + \frac{(1 - x)(1 + x)}{6}$	1; 1
90	$\frac{1}{5}x = \frac{1}{5}x^2 + \frac{5}{2}$	$\nexists x \in R$
91	$\frac{9}{4}x^2 + \frac{15}{4}x - x + \frac{4}{3} = \frac{1}{3} - \frac{1}{4}x$	$-\frac{2}{3}; -\frac{2}{3}$
92	$\frac{2}{3}x^2 - \frac{1}{2} = \frac{2}{3}x - \frac{2}{3}$	$\frac{1}{2}; \frac{1}{2}$
93	$2x^2 + \frac{1}{2}x = \frac{9}{4} - \frac{3}{4}x - \frac{3}{2}$	-1; $\frac{3}{8}$
94	$\frac{4x + 4}{3} - \frac{(x + 2)^2}{4} = \frac{4 - x^2}{6}$	2; 2
95	$\frac{2}{3}(x^2 - 1) - \frac{2 - x}{3} = \frac{x^2 - 3}{2}$	-1; -1
96	$\frac{x^2}{3} + 6(1 - x) + \frac{x(x + 2)}{2} = \frac{(x - 3)x}{3}$	2; 6
97	$\frac{(x - 1)^2}{4} - \frac{x - 1}{2} + \frac{1}{4} = 0$	2; 2
98	$(x - 1)^3 + \frac{5}{4}x = \frac{1}{4}x(2x + 1)^2$	$\frac{1}{2}; \frac{1}{2}$

99	$2x - \frac{x}{2} = \frac{3}{2} + \frac{x^2 - 2}{4}$	$3 \pm \sqrt{5}$
100	$\frac{(1-x)(x-2)}{3} = \frac{x(x+3)}{2} + \frac{x}{6} - \frac{2}{3}x^2$	$-2; -2$
101	$x^2 - \frac{x-3}{6} + 4 = 3x - 2$	$\nexists x \in \mathbb{R}$
102	$\frac{2-x}{6} + \frac{1-x}{3} + \frac{1}{8}x^2 - 1 - x + \frac{3+2x}{4} + \frac{1+x^2}{4} = 0$	$\frac{4}{3}; \frac{4}{3}$
103	$\left(x + \frac{1}{2}\right)^2 = \left(\frac{3}{2} - 2x\right)^2$	$\frac{1}{3}; 2$
104	$\frac{(2x-3)(2x+1)}{2} + 5 = (4x-1)^2 + \frac{9-19x^2}{2}$	$\frac{2}{3}; \frac{2}{3}$
105	$x^2 - 4\sqrt{3}x + 12 = 0$	$2\sqrt{3}; 2\sqrt{3}$
106	$x + \sqrt{5} = (2x - \sqrt{5})(x + \sqrt{5})$	$-\sqrt{5}; \frac{1+\sqrt{5}}{2}$
107	$x(x + \sqrt{7}) = 14$	$-2\sqrt{7}; \sqrt{7}$
108	$2\sqrt{3}x = x^2 + 2$	$\sqrt{3} - 1; \sqrt{3} + 1$
109	$\frac{x^2}{3} + 3x + 3 = 0$	$\frac{-9-3\sqrt{5}}{2}; \frac{-9+3\sqrt{5}}{2}$
110	$x^2 - \frac{1}{2} + \frac{1}{6}x = -\frac{1}{4}$	$\frac{-1-\sqrt{37}}{12}; \frac{-1+\sqrt{37}}{12}$
111	$x^2 + 16 = 6\sqrt{2}x$	$2\sqrt{2}; 4\sqrt{2}$
112	$4\sqrt{5}x - 1 = 4x^2$	$\frac{\sqrt{5}-2}{2}; \frac{\sqrt{5}+2}{2}$



113	$2\left(\frac{1}{2}x - 2\right)^2 - 19\left(\frac{1}{2}x - 3\right) - 4\left(\frac{1}{2}x - 4\right)^2 = \frac{7x - 9}{2} - 4x + 10$	3; 3
<b>equazioni frazionarie</b>		
114	$\frac{2}{x} = \frac{x}{2}$	$\pm 2$
115	$x = \frac{1}{x}$	$\pm 1$
116	$x - 1 = \frac{9}{x - 1}$	-2; 4
117	$\frac{3}{x - 1} = \frac{2x}{x + 1}$	$-\frac{1}{2}; 3$
118	$\frac{4}{3} + \frac{1}{x - 1} = \frac{1 + x}{x - 1} - \frac{x}{x + 1}$	$-\frac{1}{2}; 2$
119	$\frac{\sqrt{3}}{x} = \frac{x}{\sqrt{27}}$	$\pm 3$
120	$\frac{x^2 - 1}{2x + 4} + 1 = \frac{1}{x + 2}$	-1; -1
121	$\frac{2}{x} - \frac{2x}{x + 1} = \frac{2 - x}{x}$	1 0 non accettabile
122	$\frac{x}{x + 1} = \frac{4}{x + 2}$	$1 - \sqrt{5}; 1 + \sqrt{5}$
123	$x - 1 - \frac{1}{x - 1} = \frac{6}{6 - 6x}$	impossibile
124	$\frac{x^2 + 1}{x - 1} = 1 + \frac{5 - 3x}{x - 1}$	-3 1 non accettabile
125	$\frac{x - 1}{x + 5} - \frac{1}{x - 5} = \frac{14}{x} + \frac{11 - x}{5 - x}$	$-\frac{10}{3}; 7$

126	$\frac{x^2 + 1}{x^2 - 4} + \frac{2}{x - 2} = \frac{3}{x + 2}$	<i>impossibile</i>
127	$\frac{x^2 - 1}{2x + 4} + 1 = \frac{1}{x + 2}$	-1; -1
128	$-\frac{2}{x + 3} = \frac{1}{x^2}$	$\nexists x \in R$
129	$\frac{1}{x^2} = \frac{2}{x + 3}$	-1; $\frac{3}{2}$
130	$\frac{2}{x^2 + 1} = \frac{1 - x^2}{x^2 + 1}$	$\nexists x \in R$
131	$\frac{4}{x} + \frac{4x}{x - 3} + \frac{13}{x^2 - 3x} = 0$	$-\frac{1}{2}; -\frac{1}{2}$
132	$\frac{x}{x + 4} + \frac{x + 1}{x} = \frac{x + 2}{x^2 + 4x}$	-1; -1
133	$\frac{4 - 25x}{x^2 + 2x} + 3 + \frac{3x + 1}{x} = 0$	1; 1
134	$\frac{3x + 3}{3x + 1} = -\frac{2}{3x^2 + x} - \frac{1}{x}$	-1; -1
135	$\frac{1}{x^2} = \frac{2 - x}{x}$	1; 1
136	$\frac{4x - 3}{x^2 - 4} - \frac{3x}{x - 2} = \frac{4}{2 - x} - \frac{4x}{2 + x}$	1; 5
137	$\frac{4 - x}{18 - 2x^2} + \frac{2}{3 - x} = \frac{6x}{4x + 12}$	<i>impossibile</i>
138	$\frac{2}{x - 1} - \frac{3}{4} = \frac{2}{x^2 - 1}$	$-\frac{1}{3}; 3$
139	$\frac{x - 1}{x} = \frac{1}{x + 1} + \frac{2 + x}{x^2 + x}$	3 -1 non accettabile

140	$\frac{x-1}{x} + \frac{1}{x+1} + \frac{2+x}{x^2+x} = 0$	<i>impossibile</i>
141	$\frac{x-1}{x} + \frac{1}{x+1} = \frac{2+x}{x^2+x}$	$-\sqrt{3}; \sqrt{3}$
142	$\frac{11-3x}{4(x-1)} = \frac{1+x}{x^2-1} - \frac{1}{x+1}$	$-\frac{1}{3}; 3$
143	$\frac{1}{x^2-1} + \frac{x+1}{x-1} = \frac{1-x}{x+1}$	$\nexists x \in R$
144	$\frac{2}{x+1} + \frac{x}{1-x} = \frac{8}{1-x^2}$	$-2; 3$
145	$\frac{3x+2}{x^2+2x} + \frac{1}{x} = \frac{x+1}{x+2}$	$-1; 4$
146	$\frac{3x}{x+1} + \frac{x^2}{2x^2+x-1} = \frac{2x}{1-2x}$	$0; \frac{1}{9}$
147	$\frac{x^2-11}{x^2+2x-3} + \frac{x}{x-1} = \frac{x+1}{x+3}$	$-5; 2$
148	$2 = \frac{x-1}{x+3} + \frac{x+2}{x-1} - \frac{x^2-7}{x^2+2x-3}$	$-5; 4$
149	$\frac{4}{x^2-x} - \frac{3}{x-1} = 2$	$\frac{-1-\sqrt{33}}{4}; \frac{-1+\sqrt{33}}{4}$
150	$\frac{4}{x} + \frac{4x}{x-3} + \frac{13}{x^2-3x} = 0$	$-\frac{1}{2}; -\frac{1}{2}$
151	$\frac{x+3}{x+2} + \frac{4}{x^2+x-2} = \frac{x+2}{2x-2}$	$\pm\sqrt{2}$
152	$\frac{x+3}{x} - \frac{1}{x^2} = -\frac{1}{x}$	$-2-\sqrt{5}; -2+\sqrt{5}$
153	$\frac{3}{x(x-2)} = \frac{4x-2}{x}$	$\frac{5-\sqrt{21}}{4}; \frac{5+\sqrt{21}}{4}$

## esercizi di riepilogo

154	$4x(2 - x) + (x - 2) = -11$	$-\frac{3}{4}; 3$
155	$(2x - 1)^2 + 4(x - 2)(x + 2) = -18$	$\nexists x \in R$
156	$x(x + \sqrt{7}) = 14$	$-2\sqrt{7}; \sqrt{7}$
157	$\frac{1}{2}(x - 1) + x = (x + 1)(x - 2)$	$-\frac{1}{2}; 3$
158	$4 + (1 + 2x)^2 = 0$	$\nexists x \in R$
159	$(\sqrt{3} - 2x)^2 = (x + \sqrt{3})^2$	$0; 2\sqrt{3}$
160	$\frac{1}{3}(3 - x) + \frac{x^2 - 1}{6} - \frac{2}{3} = 0$	$1; 1$
161	$\sqrt{2}(2x + 1) + (x - \sqrt{2})^2 = x + 4$	$1 - \sqrt{2}; \sqrt{2}$
162	$2\sqrt{3}x = x^2 + 2$	$\sqrt{3} - 1; \sqrt{3} + 1$
163	$\frac{3x + 3}{3x + 1} = -\frac{2}{3x^2 + x} - \frac{1}{x}$	$-1; -1$
164	$x + 2 = \frac{6}{x + 2} + 1$	$-4; 1$
165	$\frac{1}{x + 1} + \frac{1}{12} = \frac{1}{1 - x}$	$-12 - \sqrt{145}; -12 + \sqrt{145}$
166	$\frac{1}{x + \sqrt{3}} + \frac{1}{x - \sqrt{3}} = 3$	$\frac{1 - 2\sqrt{7}}{3}; \frac{1 + 2\sqrt{7}}{3}$
167	$\frac{5}{4x} - \frac{9}{4} = \frac{x - 3}{x + 1}$	$-\frac{5}{13}; 1$

168	$\frac{x-5}{8} - \frac{x}{5} = \frac{5}{x-10}$	$-\frac{10}{3}; 5$
169	$\frac{1}{x(2-x)} - \frac{4-x}{x(x+2)} = \frac{2}{4-x^2}$	2 non accettabile 3
170	$\frac{1}{x(x+3)} - \frac{1}{x(2-x)} = \frac{1}{6x}$	$-1; 12$
171	$\frac{x+2}{x} - \frac{(2+3x)}{2(4-3x)} = 1 + \frac{4}{3x^2-4x}$	$-6$ $\frac{4}{3}$ non accettabile
172	$\frac{4-25x}{x^2+2x} + 3 + \frac{3x+1}{x} = 0$	1: 1
173	$\frac{x}{x-6} - \frac{1}{2} = \frac{x}{6} + \frac{x+6}{6-x}$	$-3; 18$
174	$\frac{4}{(x-2)^2} + 3 = \frac{3x}{2-x}$	$\nexists x \in R$
175	$\frac{1}{3x-x^2} - \frac{1}{6x} = \frac{1}{2x-x^2}$	$\nexists x \in R$
176	$\frac{x-\sqrt{3}}{x\sqrt{3}-1} = \frac{2\sqrt{3}}{3x^2-1} - \frac{x}{x\sqrt{3}+1}$	$-\frac{\sqrt{3}}{2}; \sqrt{3}$
177	$\frac{4}{(x-2)^2} - \frac{3}{x^2} = \frac{5}{4x-2x^2}$	$\frac{-7-\sqrt{217}}{7}; \frac{-7+\sqrt{217}}{7}$
178	$\frac{5}{2x+2} + \frac{1}{2x-2} = \frac{3x+2}{x^2+x+1}$	0; 4
179	$\frac{5}{6+2x} - \frac{1}{x^2-3x} = \frac{5}{9-x^2}$	$-\frac{3}{5}; 2$

180	$\frac{2}{(x-1)^2} - \left(x - \frac{1}{x-1}\right)\left(x - \frac{1}{x+1}\right) + \left(x - \frac{1}{x-1}\right)^2 = 0$	$1 - \sqrt{3}; 1 + \sqrt{3}$
181	$\frac{1}{x-5} - \frac{1}{4-x} = \frac{2}{x-4} + \frac{1}{x-3}$	$5 - \sqrt{2}; 5 + \sqrt{2}$
182	$\frac{x+3}{x+1} + \frac{x+5}{x+2} = \frac{2x+2}{x}$	$-\frac{4}{3}; 1$
183	$\frac{x^2}{200-x^2} = \frac{1}{7}$	$\pm 5$
184	$\frac{2(x-1)}{x+1} + \frac{(x+1)}{4(x-1)} = 3$	$\frac{-7-4\sqrt{7}}{3}; \frac{-7+4\sqrt{7}}{3}$
185	$\frac{x-2}{3-x} + \frac{2x+9}{x^2-9} = \frac{2x+1}{x+3}$	$1 - \sqrt{7}; 1 + \sqrt{7}$
186	$\frac{5x^2 - 5x - 28}{x^2 - x - 6} = \frac{4}{x+2} - \frac{2}{x-3}$	$-1; \frac{12}{5}$
187	$\frac{x+3}{x-1} - \frac{1-x}{x+3} = \frac{4x+28}{x^2+2x-3}$	$3$ $-3$ non accettabile
188	$1 - \frac{x-5}{x-2} - \frac{x+1}{x^2-5x+6} = \frac{x-5}{x^2-6x+8}$	$5; 5$
189	$\frac{x-1}{x-3} - \frac{x+2}{x+2} = \frac{4x-6}{x}$	$\frac{5-\sqrt{7}}{2}; \frac{5+\sqrt{7}}{2}$
190	$\frac{x+3}{x-1} - \frac{1-x}{x+3} = \frac{4x+28}{x^2+2x-3}$	$3$ $-3$ non accettabile
191	$\frac{x+3}{x+2} + \frac{4}{x^2+x-2} = \frac{x+2}{2x-2}$	$+\sqrt{2}; -\sqrt{2}$

192	$1 - \frac{x-5}{x-2} - \frac{x+1}{x^2-5x+6} = \frac{x-5}{x^2-6x+8}$	5; 5
193	$\frac{3x+2}{2x^2-2x-12} - \frac{3-x}{4x-12} = -\frac{3}{x+2}$	-19; 2
194	$\frac{x}{x^2-5x+6} + \frac{x}{x^2+x-6} = \frac{1}{x-2}$	<i>impossibile</i>
195	$\frac{x-4}{x-2} + \frac{x-1}{x^2-5x+6} = \frac{4-2x}{3-x}$	-1 3 non accettabile
196	$\frac{x-3}{x-1} - \frac{4}{3} + \frac{x-1}{x+1} = 0$	$3 - \sqrt{10}; 3 + \sqrt{10}$