

Equazioni logaritmiche

indice

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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.

1. risolvere le seguenti equazioni utilizzando la definizione ed i teoremi sui logaritmi 

1	$\log_3 x = 2$	9
2	$\log_2 x = 0$	1
3	$\log_3 x = 1$	3
4	$\log_5 x = 2$	25
5	$\log_1 x = 5$	<i>impossibile</i>
6	$\log_0 x = 2$	<i>impossibile</i>
7	$\log_{-2} x = 3$	<i>impossibile</i>
8	$\log_{\frac{1}{2}} x = 3$	$\frac{1}{8}$
9	$\log_{\frac{1}{3}} x = 4$	$\frac{1}{81}$
10	$\log_{\frac{1}{10}} x = -3$	10^3
11	$\log_5 x = \frac{1}{2}$	$\sqrt{5}$
12	$\log_{\frac{1}{3}} x = \frac{1}{2}$	$\frac{\sqrt{3}}{3}$
13	$\log_{\frac{1}{5}} x = -\frac{1}{3}$	$\sqrt[3]{5}$
14	$\log_{\frac{1}{4}} x = -4$	4^4

15	$\log_{100} x = -\frac{1}{2}$	$\frac{1}{10}$
16	$\log_{0,09} x = \frac{1}{2}$	$\frac{3}{10}$
17	$\log_{\frac{27}{125}} x = -\frac{1}{3}$	$\frac{5}{3}$
18	$\log_{\frac{32}{3}} x = -\frac{1}{5}$	$\frac{\sqrt[5]{3}}{2}$
19	$\log x = 0,01$	$100\sqrt{10}$
20	$\log_{\frac{2}{5}} x = -\frac{3}{4}$	$\frac{\sqrt[4]{250}}{2}$
21	$\log_{\frac{8}{27}} x = -\frac{1}{3}$	$\frac{3}{2}$
22	$\log_{25} x = -\frac{1}{2}$	$\frac{1}{5}$
23	$\log_{\sqrt[4]{3}} x = 4$	3
24	$\log_{\frac{3}{5}} x = 1$	$\frac{3}{5}$
25	$\log_{0,8} x = -1$	$\frac{5}{4}$
26	$\log_{0,0016} x = \frac{1}{4}$	$\frac{1}{5}$
27	$\log_{\frac{3}{4}} x = -\frac{2}{3}$	$\frac{2\sqrt[3]{6}}{3}$
28	$\log_{\frac{7}{6}} x = -\frac{3}{2}$	$\frac{6\sqrt{42}}{49}$

29	$\log_{\frac{3}{8}} x = -2$	$\frac{64}{9}$
30	$\log_{\sqrt{2}} x = -2$	$\frac{1}{2}$
31	$\log_{\frac{3}{4}} x = -\frac{3}{4}$	$\frac{2^4\sqrt{12}}{3}$
32	$\log_{\frac{1}{2}} x = -\frac{2}{3}$	$\sqrt[3]{4}$
33	$\ln 2x = 3$	$\frac{e^3}{2}$
34	$2 \log x = 1$	$\sqrt{10}$
35	$\log_{\frac{1}{3}} x + 3 = 0$	27
36	$\log_{\frac{1}{3}}(x + 3) = 0$	-2
37	$\ln(x + 2) = 0$	-1
38	$\ln(x + 1) = -2$	$\frac{1}{e^2} - 1$
39	$\log_3(2x - 1) = -1$	$\frac{2}{3}$
40	$\log_{\frac{1}{2}}(x - 2) = 0$	3
41	$\log_4(3x - 4) = -\frac{3}{2}$	$\frac{11}{8}$
42	$\log_2(x - 1) = 3$	9

43	$2 - \log_3(3x - 7) = 0$	$\frac{16}{3}$
44	$\log_3 \frac{x-2}{3} = -2$	$\frac{10}{3}$
45	$\log_5(x^2 + x + 1) = 1$	$\frac{-1 \pm \sqrt{17}}{2}$
46	$\sqrt{1 + \log_{\sqrt{2}} x} = 3$	16
47	$\log_{0,01}(\sqrt{x+1} + 2) = -\frac{1}{2}$	63
48	$\log_4(2x - 1) = \log_4 x$	1
49	$\log_2(x - 1) + \log_2 x = 0$	$\frac{1 + \sqrt{5}}{2}$
50	$\log(x - 3) - \log(2x + 1) = 0$	<i>impossibile</i>
51	$\log_2(x^2 + 4x + 3) - \log_2(x + 1) = 0$	<i>impossibile</i>
52	$\log \frac{x^2 - 1}{x} = \log 2$	$1 \pm \sqrt{2}$
53	$\log_3 \sqrt{x^2 - x} = \log_3 \sqrt{2}$	-1; 2
54	$\log_3(x + 4) = \log_3(2 - x)$	-1
55	$\log_5 \sqrt{x - 3} = \frac{1}{2} \log_5(3x - 4)$	<i>impossibile</i>
56	$\log_3(x - 1) = \frac{1}{2} \log_3 x$	$\frac{3 + \sqrt{5}}{2}$

57	$\ln x = 2 \ln 2x$	$\frac{1}{4}$
58	$\log(3x - 5) + \log(x - 2) = \log 2$	$\frac{8}{3}$
59	$\log(x - 2) - \log(x - 1) = \log 5$	<i>impossibile</i>
60	$2 \log_2 x = 2 + \log_2(x + 3)$	6
61	$\log(x - 2) + \log 5 = \log x$	$\frac{5}{2}$
62	$\ln 2x + \ln \frac{x}{2} = \ln 4$	2
63	$\ln 2 + \ln x = 2 \ln(4x - 15)$	$\frac{9}{2}$
64	$\log 5 - \log(2x - 3) = 1$	$\frac{7}{4}$
65	$\ln x + \ln 3 = \ln(x^2 + 2)$	1; 2
66	$\log_3(3x + 1) - \log_3 x = 2$	$\frac{1}{6}$
67	$1 + \log_3 x - \frac{1}{2} \log_3(10x - 1) = 0$	$\frac{1}{9}; 1$
68	$\log_3(x^2 + 3x - 16) - \log_3(x + 3) = 1$	5
69	$\frac{1}{2} \log(3x - 1) + \log 3 = -\log 0.1$	$\frac{109}{27}$
70	$\ln(x^2 + 12x + 5) = \ln 2 + \ln(x - 10)$	<i>impossibile</i>

71	$\log_{\frac{1}{3}} x - \log_{\frac{1}{3}}(x - 2) - 2 \log_{\frac{1}{3}} 3 = 0$	$\frac{9}{4}$
72	$\log_{\sqrt{2}}(1 + x^2) - \log_{\sqrt{2}}(x + 2) - 2 = 0$	$-1; 3$
73	$\ln(28 - x^3) - \ln(7 - x) = 2\ln(4 - x)$	$2; \frac{14}{5}$
74	$\log(x - 1) - 2 \log(x + 1) - \log 8 = -2$	$\frac{3}{2}; 9$
75	$\ln(x - 2) - \ln 3 = \ln(5 - x) - \ln 2$	$\frac{19}{5}$
76	$\ln(4x + 5) + \ln(x - 2) = \ln 3 + \ln(5 - x)$	$\frac{5}{2}$
77	$\ln 10 - \ln(x - 1) = \ln 8 - \ln(x + 3)$	<i>impossibile</i>
78	$\log(x - 1) - \log(x + 1) + \log(1 - 2x) = 0$	<i>impossibile</i>
79	$\log_3 2 + \log_3 x = \log_3 \frac{1}{2} + \log_3 \frac{1}{x}$	$\frac{1}{2}$
80	$\log(10 - x^2) - \log 8 = 2 \log \frac{x}{5} - 2 \log \frac{\sqrt{2}}{5}$	$\sqrt{2}$
81	$\log(x - 1) - 2 \cdot \log(x + 1) - \log 8 = -2$	<i>impossibile</i>
82	$\log_2(x + 1) + \log_2 3 = \log_2(x - 1)$	-2
83	$\log_4(x^2 + 2) - \log_4(x^2 - 1) = \log_4 5 - \log_4(x + 1)$	<i>impossibile</i>
84	$\log_3(3x - 1) + \log_3(4 - x) - 1 = \log_3(x + 2) + \log_3(2 - x)$	$\frac{16}{13}$

85	$\frac{1}{2} \ln(x-1) + \ln \sqrt{3} = \frac{1}{2} [\ln(5x^2 - 20) - \ln(x-2)]$	<i>impossibile</i>
86	$\log_3 4 + \log_3 2 + 2 \log_3 x = \log_3(x^2 - 3) + \log_3(x^2 + 3)$	3
87	$3 \log_2(x+2) - 3 \log_2(2x-1) + \log_2 4 - \log_3 9 = 0$	3
88	$\log(2x+2) - \log(x-1) = 1 - [\log(3x-2) - \log x]$	$\frac{3 \pm \sqrt{5}}{2}$
89	$\log_{\frac{1}{3}} \log_{\frac{1}{3}}(5x+9) = 0$	$-\frac{26}{15}$
90	$\log_2 \log_3 \frac{3x-1}{x} = 2$	$-\frac{1}{78}$
91	$\log_{\frac{1}{3}} \log_2(3x-1) = 0$	1
92	$\log_{2x}(x^2+1) = 1$	1
93	$\log_x 2 = \frac{1}{\sqrt{2}}$	$2^{\sqrt{2}}$
94	$\log_x 4 = 1$	4
95	$\log_{x+1} 1 = 0$	$-1 < x < 0 \vee x > 0$
96	$\log_{x-2} 9 = 2$	5
97	$\log_{\frac{1}{x}} -2 = 2$	<i>impossibile</i>
98	$\log_{3-2x} \frac{1}{3} = -2$	$\frac{3 - \sqrt{3}}{2}$

99	$\log_x x = 0$	impossibile
100	$\log_x(2x + 3) = 2$	3
101	$2 \log_{3x-1} 4 = 1$	$\frac{17}{3}$
102	$\log_{x-1}(7 - 3x) = 2$	impossibile
103	$\log_x x - 3 = 1$	$\frac{3}{2}$
104	$\log_{x+1} x^2 + x = \log_{x+1} x^2 - 3x + 2 $	$\frac{1}{2}$

2. risolvere le seguenti equazioni utilizzando anche una variabile ausiliaria 

105	$\log_2^2 x - 4 \log_2 x + 4 = 0$	4
106	$\log_2^2 x - 4 \log_2 x + 3 = 0$	2; 8
107	$\log_2^2 x - \log_2 x^3 + 2 = 0$	2; 4
108	$\log_2^2 x + \log_2 x - 12 = 0$	$\frac{1}{16}$; 8
109	$\ln^2 x - 2 \ln x + 1 = 0$	e
110	$2 \log^2 x + 3 = 7 \log x$	10^3 ; $\sqrt{10}$
111	$3 \log^2 x + 5 \log x = 0$	1; $10^{-\frac{5}{3}}$

112	$\log_3^2 x + \log_3 x - 12 = 0$	$27; \frac{1}{81}$
113	$-2\ln^2 x + \ln x + 1 = 0$	$e; \frac{1}{\sqrt{e}}$
114	$2 \log^2 x + 5 \log x - 3 = 0$	$10^{-3}; \sqrt{10}$
115	$3 \log^2 x + \log x = -4$	<i>impossibile</i>
116	$3(\log x + 1) = 5 \log^2 x$	$10^{\frac{3-\sqrt{69}}{10}}; 10^{\frac{3+\sqrt{69}}{10}}$
117	$3 \log_{\frac{1}{2}}^2 x - 11 \log_{\frac{1}{2}} x - 4 = 0$	$\sqrt[3]{2}; \frac{1}{16}$
118	$4 \log_{\frac{1}{2}}^2 x - 5 \log_{\frac{1}{2}} x + 1 = 0$	$\frac{1}{2}; \frac{\sqrt[4]{8}}{2}$
119	$3 \log_2^2 x - 7 \log_2 x + 2 = 0$	$\sqrt[3]{2}; 4$
120	$3 \ln^2 x + 5 \ln x - 2 = 0$	$e^{-2}; \sqrt[3]{e}$
121	$\log_2^2 x + 95 = 8\sqrt{6} \log_2 x$	$2^{4\sqrt{6}-1}; 2^{4\sqrt{6}+1}$
122	$\log^3 x + 2 \log^2 x - 3 \log x = 0$	$\frac{1}{1000}; 1; 10$
123	$\log_3^3 x - \log_3^2 x - 2 \log_3 x = 0$	$\frac{1}{3}; 1; 9$
124	$\log^3 x - \log x = 0$	$\frac{1}{10}; 1; 10$

125	$\ln^3 x - 9 \ln x = 0$	$1; e^3; e^{-3}$
126	$\log^3 x - \log^2 x = 0$	$1; 10$
127	$5 \ln^3 \sqrt{x} + 6 \ln^2 \sqrt{x} - 9 \ln \sqrt{x} = 2$	$e^{-4}; \frac{\sqrt[5]{e^3}}{e}; e^2$
128	$\log_3^2(x-1) - 2 \log_3(x-1) = 3$	$\frac{4}{3}; 28$
129	$2 \ln^2(x-1) - 5 \ln(x-1) + 2 = 0$	$\sqrt{e} + 1; e^2 + 1$
130	$\log_3^2(x+2) - \log_3(x+2) - 2 = 0$	$-\frac{5}{3}; 7$
131	$\ln^2(x^2 - 1) + 3 \ln(x^2 - 1) = 0$	$\pm \sqrt{1 + \frac{1}{e^3}}; \pm \sqrt{2}$
132	$(\log_2 x^2)^2 + 9 \log_2 x + 2 = 0$	$\frac{1}{4}; \frac{\sqrt[4]{8}}{2}$
133	$\log x (\log x + 1) + 5 \log x = \log^2 x + 4 \log x - 7$	$10^{-\frac{7}{2}}$
134	$\log_3^2(4-x) - 2 \log_3(4-x) = 0$	$-5; 3$
135	$\log_2 x^3 \left(\log_2 x + \frac{7}{3} \right) - 6 = 0$	$\frac{1}{8}; \sqrt[3]{4}$
136	$3 \log_{\frac{2}{2}}^2 x - \left(\log_{\frac{1}{2}} x - 1 \right)^2 = 3$	$\frac{1}{2}; 4$
137	$(2 \log x - 5) \log x = 3 - \log x$	$10^{\frac{2-\sqrt{10}}{2}}; 10^{\frac{2+\sqrt{2}}{2}}$

138	$(\log_2(3x + 4) - 1)^2 = \log_2 2$	-1; 0
139	$\log_{\frac{1}{2}}[x(x + 4)] = \log_{\frac{1}{2}}[x(x + 4)]$	$-2 \pm \sqrt{5}; -\frac{4 \pm 3\sqrt{2}}{2}$
140	$\log_3 2x^2 (\log_3 2x^2 - 1) = \log_3 2x^2 + 3$	$\pm \sqrt{\frac{27}{2}}; \pm \sqrt{\frac{1}{6}}$
141	$\log_3^2(2x^2 - x) = 1$	$-1; \frac{3}{2}; \frac{3 \pm \sqrt{33}}{12}$
142	$\log_2^4(2x - 3) - 5\log_2^2(2x - 3) + 4 = 0$	$\frac{5}{2}; \frac{7}{2}; \frac{7}{4}; \frac{13}{8}$
143	$\sqrt{\ln x} = 1 - \ln x$	$e^{\frac{3-\sqrt{5}}{2}}$
144	$\ln^2 x + 2 \ln x = 15$	$e^{-3}; e^3$
145	$\log_{x-1}^2 3 - \log_{x-1} 3 - 2 = 0$	$\frac{4}{3}; 1 + \sqrt{3}$
146	$\log_{2x+1}^2 27 + \log_{2x+1} \frac{1}{27} - 6 = 0$	$1; \frac{\sqrt{3} - 9}{18}$

3. risolvere le seguenti equazioni con logaritmi di basi diverse



147	$\log_2 x = \log_3 9$	4
148	$\log_{\frac{1}{2}} x + 8\log_{49} 7 = 0$	16
149	$2 \log_2 x = \log_{\frac{1}{4}} 3x$	$\sqrt[5]{\frac{1}{3}}$

150	$\log_3 x = \log_4 64$	27
151	$2 \log_2 x = \log_5 25$	2
152	$\log_5 x - \log_{25} x = 1$	25
153	$3 \log_9 x + \log_3 x = 10$	81
154	$\log_2 \frac{x}{2} - \log_4 3x = 1$	48
155	$\frac{1}{2} \log_3 x^2 + 2 = -\log_{\frac{1}{3}} 2$	$\pm \frac{2}{9}$
156	$\log_{\frac{1}{9}} x - \log_{\frac{1}{3}} x + \log_4 16 = 0$	$\frac{1}{81}$
157	$3 \log_9 x - \log_{\frac{1}{3}} x = 2 - 2 \log_3 x$	$\sqrt[9]{81}$
158	$\log_2 \sqrt[3]{x} - \log_4 x + \log_2 x^2 = 2$	$2^{11} \sqrt{2}$
159	$\log_5 \sqrt[16]{5} + 2 \log_{25} x - 3 \log_5 x = 0$	$\sqrt[32]{5}$
160	$\log_2 x \sqrt{x} + 4 \log_4 \sqrt{x} - \log_{16} x^{12} - 1 = 0$	$\frac{1}{4}$
161	$\log_2 (3 - 2x) - 2 \log_{\frac{1}{2}} x = 0$	1

162	$2 \log_2(x+2) + \log_{\frac{1}{2}} x + 1 = 0$	<i>impossibile</i>
163	$3 \log_{\frac{1}{2}} x - 2 = \log_2(x^3 - 1)$	$\sqrt[3]{\frac{1+\sqrt{2}}{2}}$
164	$\log_2(x-2) - \log_4(3x-1) = 1$	$8 + 2\sqrt{14}$
165	$2 \log_{\frac{1}{3}}\left(\frac{1}{3}x - 1\right) = 2 - \log_9 x^4$	<i>impossibile</i>
166	$\log_2 \ln(x+1) = 1 - \log_4 3$	$\frac{2}{e\sqrt{3}} - 1$
167	$\log_2(x + 2x^2) - \log_3 9 = 1$	$\frac{-1 \pm \sqrt{65}}{4}$
168	$\log_4(1 - x^2) - \log_4(5x^2 + 3) = \log_2 x$	$\frac{\sqrt{5}}{5}$
169	$\log_{\frac{1}{4}}(x+1) + \log_{\sqrt{2}} x - \log_2 4x^2 = 0$	<i>impossibile</i>
170	$\log_2(x-2) - \log_2(3-2x) = \log_{\frac{1}{2}} 4x$	<i>impossibile</i>
171	$\log_3^2(3x-1) - \log_{\frac{1}{3}}(3x-1)^4 + 3 = 0$	$\frac{4}{9}; \frac{28}{81}$
172	$\log_{\frac{1}{2}}(x-1) - \log_2(x+1) = 3$	$\frac{3\sqrt{2}}{4}$
173	$\log(3^{2x} + 2) + \log_{\frac{1}{10}}(3^x - 2) = 1$	$\log_3 5 + \sqrt{3}$


174	$\log_3(2x - 1) + \log_{\frac{1}{3}}(x - 4) = -1$	<i>impossibile</i>
175	$\log_3^2(x - 2) + \log_{\frac{1}{3}}(x - 2) = 6$	$\frac{19}{9}; 29$
176	$\log_2^2(2x + 1) - \log_{\frac{1}{2}}(2x + 1) = 0$	$0; -\frac{1}{4}$
177	$-\log_{\frac{1}{3}}(2x + 5) (\log_3(2x + 5) - 1) = 2$	$-\frac{7}{3}; 2$
178	$(2x - 1) \log_7 2 = 1 + x \log_{\frac{1}{7}} 4$	$\frac{\ln 14}{\ln 16}$
179	$\log_{\frac{1}{3}}^2(3x + 1) + \log_3(3x + 1)^6 = -9$	$-\frac{26}{81}$
180	$\log_2(x - 3)^2 (\log_2(x - 3) - 2) - \log_{\frac{1}{2}}(x - 3) = 2$	$7; \frac{1}{\sqrt{2}} + 3$
181	$2\log_4^2 x(x - 1) + \log_{\frac{1}{4}}[x(x - 1)]^7 + 3 = 0$	$-1; 2; \frac{1 \pm \sqrt{257}}{2}$
182	$3\log_8^2[x(x - 2)] = 1 - 2\log_{\frac{1}{16}}[x(x - 2)]$	$1 \pm \sqrt{1 + 2^{\frac{3 \pm \sqrt{57}}{4}}}$
183	$\log_2(1 + \sqrt{x + 1}) + \log_2(1 - \sqrt{x + 1}) = \log_4(2 - x)$	<i>impossibile</i>
184	$\log_x 3 = 2 \log_{\frac{1}{x} + 1} \sqrt{3}$	$\frac{1 + \sqrt{5}}{2}$
185	$\log_{x+2} 4 + \log_4(x + 2) = 2$	2
186	$\frac{1}{5} \log_3(x + 1) - \log_{x+1} 3 = \frac{4}{5}$	$-\frac{2}{3}; 242$
187	$\log_3(3x - 1) + \log_{3x-1} 9 = 3$	$\frac{4}{3}; \frac{10}{3}$

4. risolvere le seguenti equazioni frazionarie - prodotto



188	$\frac{\log_5(2x^2 - x)}{\log_5(x^2 + 4x)} = 1$	5
189	$\frac{\log_2 x}{\log_2(x - 1)} = 2$	$\frac{3 + \sqrt{5}}{2}$
190	$\frac{\ln x + 1}{\ln^2 x + 1} = 1$	1; e
191	$\frac{\log(10 - x)}{\log(4 - x)} = 2$	1
192	$(\log x - 3)(\log x + 3) = 0$	$10^3; 10^{-3}$
193	$\left(\frac{1}{2} \ln 2x - \ln 3\right) \left(\frac{1}{\ln x} - 4\right) = 0$	$\frac{9}{2}; \sqrt[4]{e}$
194	$\log_2(x - 1) (3 \ln x - 2) = 0$	$2; \sqrt[3]{e^2}$
195	$\frac{\log x - 1}{\log^2 x} - \frac{3}{\log x} = 1$	$\frac{1}{10}$
196	$\frac{5}{\ln x + 4} - \frac{3}{\ln x - 2} = 4$	$e; e^{-\frac{5}{2}}$
197	$\frac{3}{\log_2 x - 1} + \frac{2}{\log_2 x + 1} = 2$	$8; \frac{\sqrt{2}}{2}$
198	$\frac{1}{\log x} + \frac{2}{\log x + 1} = 2$	$\frac{\sqrt{10}}{10}; 10$
199	$\frac{1}{\log_{\frac{1}{8}} x} + \frac{1}{2 + \log_{\frac{1}{8}} x} = \frac{3}{4}$	$\frac{1}{64}; 16$

200	$\frac{1 + \log x}{\log x - 1} - \frac{\log x + 3}{2 - 2\log x} = \frac{11}{2}$	10^2
201	$\frac{1 + \log x}{\log x - 1} + \frac{\log x + 3}{2 - 2\log x} = \frac{11}{2}$	<i>impossibile</i>
202	$\frac{4 - 2 \log_4 x}{\log_4 x} = \frac{5 + 3 \log_4 x}{3 \log_4 x + 5}$	$4^{\frac{4}{3}}$
203	$\frac{\log_a x}{\log_a x - 1} - 1 = \frac{2}{1 + \log_a x}$	$a^3 \wedge a > 0 \wedge a \neq 1$
204	$\frac{3 \log_2 x - 1}{2 \log_2 x + 8} - \frac{2 \log_2 x - 3}{\log_2 x^4 + 4} = \frac{13}{40}$	$2; 2^{\sqrt[3]{128}}$
205	$\frac{1}{\ln^2 x - 1} - \frac{1}{\ln x - 1} - \frac{1}{\ln x + 1} = 0$	\sqrt{e}
206	$\frac{\log_2 x + 1}{\log_2 x - 2} - \frac{\log_2 x + 2}{1 - \log_2 x} = 2$	$2\sqrt{2}$
207	$\frac{1}{2 \log_2 x - 2} + \frac{3}{\log_2^2 x - 1} = \frac{1}{4}$	$\frac{1}{8}; 32$
208	$2 \log_2(x + 3) + \frac{2}{\log_2(x + 3)} = 5$	$\sqrt{2} - 3; 1$
209	$\frac{3}{\log_4 x} + \frac{3}{2 + \log_4 x} = -\frac{1}{\log_4 x + 1}$	$\frac{-2\sqrt{7} \pm 2}{2\sqrt{7}}$
210	$\frac{\log_2 x}{\log_2 x + 3} - \frac{6}{\log_2 x - 3} + \frac{72}{9 - \log_2^2 x} = 0$	$\frac{1}{2^6}; 2^{15}$

211	$\log_2(x - 4) - 3 = \frac{2}{\log_{\frac{1}{2}}(x - 4)}$	6; 8
212	$\frac{6}{1 - \log_8^2 x} + \frac{3 \log_8 x}{\log_8 x + 1} = \frac{2 - \log_8 x}{\log_8 x - 1}$	64
213	$\frac{\log x + 3}{\log x - 3} - \frac{\log x - 3}{\log x + 3} = \frac{5 \log x}{\log^2 x - 9}$	1
214	$\frac{\sqrt{2 \log x}}{3} + \frac{\log x}{\sqrt{\log x}} = 3 + \sqrt{2}$	10^9
215	$\frac{4}{\log_9 x} - \left(2 - \frac{3}{\log_9 x}\right) - 2 \left(1 - \frac{1}{\log_9 x}\right) = 14$	3
216	$\frac{\log x - 2}{\log x - 1} + \frac{\log x - 2}{\log x - 3} = \frac{\log^2 x - 4}{(\log x - 3)(1 - \log x)}$	$10^2; 10^{\frac{2}{3}}$
217	$\frac{\log^2_{\frac{1}{3}}(1 - x) - 1}{\log^2_{\frac{1}{3}}(1 - x) - 9} - \frac{1}{\log_{\frac{1}{3}}(1 - x) + 3} + \frac{\log_{\frac{1}{3}}(1 - x) - 1}{\log_{\frac{1}{3}}(1 - x) - 3} = 0$	$-2; 1 - \frac{\sqrt{3}}{3}$
218	$\frac{5}{\log^2_{\frac{1}{2}} x - 5 \log_{\frac{1}{2}} x + 6} - \frac{1}{\log^2_{\frac{1}{2}} x - 3 \log_{\frac{1}{2}} x + 2} - \frac{3}{\log^2_{\frac{1}{2}} x - 4 \log_{\frac{1}{2}} x + 3} = 0$	16
5. risolvere le seguenti equazioni logaritmiche/esponenziali 		
219	$\ln 2^x = 0$	0
220	$\log_5 7^x = 1$	$\log_7 5$
221	$\log_2 3^x - 2 = 0$	$\frac{\ln 4}{\ln 3}$

222	$\log_5 2^{x-1} = \frac{1}{4}$	$1 + \frac{1}{4 \log_5 2}$
223	$\ln(1 - e^x) = 0$	<i>impossibile</i>
224	$\ln 4^{x^2-6} - \ln 64 = 0$	± 3
225	$\log(e^x + e) = 2$	$\ln(100 - e)$
226	$2 \log_3 4^x = \log_{\frac{1}{3}} 2^{-x}$	0
227	$\ln 2^{\frac{x-1}{2}} - 1 = 0$	$1 + \frac{2}{\ln 2}$
228	$2 \ln 3^{\frac{x-1}{3x+1}} = \ln 9$	-1
229	$\log(e^x + 1) = \log(e^{2x} - 1)$	$\ln 2$
230	$\ln(e^{2x} - 1) = \ln(1 - e^x)$	<i>impossibile</i>
231	$\log(5^{1+\sqrt{x}} + 5^{1-\sqrt{x}}) = 1$	0
232	$\ln(2^{2x} - 9 \cdot 2^x + 21) = 0$	$2; \frac{\ln 5}{\ln 2}$
233	$\log_3 \left(9^{x+\frac{3}{2}} - 2 \right) = x + 1$	-1
234	$\log_2(4^x + 2^x) - \log_2 2 = 0$	0
235	$\log_2(2^x - 1) \log_2(2^{x+1} - 2) = 0$	$1; \log_2 \frac{3}{2}$

236	$1 - \log 3^x = \log 2^x$	$\frac{\ln 10}{\ln 6}$
237	$\frac{3}{2} \ln 2^{x+1} - 2 \ln \frac{1}{2} = 1$	$\frac{1}{3} \left(\frac{2}{\ln 2} - 7 \right)$
238	$-2 \log 4^{2-x} + 5 \log 2^{x+1} = 1$	$\log_{512} 80$
239	$\ln 3^x + 2 \log_{3^x} e - 3 = 0$	$\frac{1}{\ln 3}; \frac{2}{\ln 3}$
240	$\log(3^x + 1) + \log(3^x - 1) = 2$	$\frac{1}{2} \log_3 101$
241	$-\ln 2^x + 2 \ln 3 = 1 - \ln 4^{-x}$	$\frac{\ln 9 - 1}{\ln 8}$
242	$(x + 1) \ln 3 - \ln \frac{1}{9} = 2 \ln \left(\frac{1}{3} \right)^x$	-1
243	$x \log 2 - 3 \log_{2^x} 10 - 2 = 0$	$-\frac{\ln 10}{\ln 2}; 3 \frac{\ln 10}{\ln 2}$
244	$3 - x + \log_2 3^{2x+1} = 0$	$-\frac{\ln 24}{\ln 9 - \ln 2}$
245	$2 - 3x \log_4 3^x + 2(\log_4 9 - \log_4 4) = 0$	$\pm \frac{2}{3} \sqrt{3}$
246	$\log_2(2^x + 1) + \log_2^2(2^x + 1) - 2 = 0$	0
247	$\log 5 + (x - 2) \log 4 = \log(4^x - 11)$	2
248	$3 \log_2 2^x + 4 \log_4 \sqrt{2^x} = 1 + \frac{1}{2} \log_2 2^{6x}$	1
249	$2 \log \sqrt[4]{2^x} = 3x \log 2 - \log 2 - \log 2^{1-x} + \log(4 \cdot 2^x)$	0
250	$x \log_2 3 + \log_2 5^x = (2x - 1) \log_2 5 - x \log_2 5$	$-\frac{\ln 5}{\ln 3}$

251	$\log(2^{4x} - 1) + 2 \log 3 = (1 - 2x) \log 4$	$\log_{16} \left(\frac{4}{3} \right)$
252	$\log(4^x - 1) + \log 2 = \log(2^{2x} + 3 \cdot 2^{x+1} - 10)$	2
253	$((x + 1) \log 3 - 1)(1 + \log 3^{x+1}) = 0$	$-1 \pm \frac{1}{\log 3}$
254	$\ln 3^x - 1 = x \ln 9$	$\log_3 \left(\frac{\sqrt{5} - 1}{2} \right)$