

## equazioni esponenziali risolubili mediante applicazioni delle proprietà delle potenze

1	$6^x = 36$	2
2	$3^x = 81$	4
3	$5^x = 125$	3
4	$2^{5x} = 32$	1
5	$4^x = 8$	$\frac{3}{2}$
6	$49^x = 7$	2
7	$10^x = 0,01$	-2
8	$3^{x+2} = 81$	2
9	$2^{2x} = 8$	$\frac{3}{2}$
10	$a^{6x} = a^{x^2} \quad a > 0$	0; 6
11	$3^x - 3 = 0$	1
12	$49^x = \frac{1}{7}$	$-\frac{1}{2}$
13	$a^x = -2 \quad a > 0$	<i>impossibile</i>
14	$5^{x^2} = \frac{1}{25}$	<i>impossibile</i>
15	$\left(\frac{1}{3}\right)^{x+1} = 9$	-3

16	$\left(\frac{2}{3}\right)^{-3x} = \frac{27}{8}$	1
17	$8^{x^2-3x} = 1$	0; 3
18	$7^{x^2+4x+3} = \frac{1}{7}$	-2
19	$3^{3x} = \frac{1}{27}$	-1
20	$\left(\frac{7}{3}\right)^{-2x} = \frac{9}{49}$	1
21	$4^{x+8} = \frac{1}{4^{2x-5}}$	-1
22	$243^{\frac{2}{x}-1} = 27^{2(x+1)}$	$-\frac{5}{2}; \frac{2}{3}$
23	$7^{x^2-4x} - 1 = 0$	0; 4
24	$2^{x^2+x-20} = 1$	-5; 4
25	$3^{x^2-3x+6} = 1$	<i>impossibile</i>
26	$9^{x+2} = 27$	$-\frac{1}{2}$
27	$3^{x+2} = 81$	2
28	$5^x = \left(\frac{1}{5}\right)^5$	-5
29	$7^{x+1} = \left(\frac{1}{7}\right)^{5+x}$	-3

30	$3^{2x+3} = \frac{1}{3}$	-2
31	$4^{\sqrt{x+1}} = 16$	3
32	$4^{\sqrt{x+2}} = 4$	-1
33	$7^{\sqrt{x^2-1}} = 49$	$\sqrt{5}; -\sqrt{5}$
34	$4 \cdot 2^x = 1$	-2
35	$9 \cdot 3^x = 3$	-1
36	$4^{\sqrt{x+1}} = 16$	3
37	$3^{x+2} = 81$	2
38	$2^{x+2} + 2^x = 640$	7
39	$3^{x+1} - 3^x = 162$	4
40	$\left(\frac{1}{2}\right)^x - 4 = 0$	-2
41	$3^{2x} + 9 = 0$	<i>impossibile</i>
42	$4 \left(\frac{1}{2}\right)^{3x} = 1$	$\frac{2}{3}$
43	$3(3^x - 1) = -2$	-1

44	$7^{x^2-1} - 343 = 0$	$-2; 2$
45	$(3^x - 1) \left(5^{2x} - \frac{1}{5}\right) = 0$	$0; -\frac{1}{2}$
46	$108 \cdot 3^{2x} = 72 \cdot 4^x$	$-\frac{1}{2}$
<b>equazioni esponenziali risolubili mediante una variabile ausiliaria</b>		
47	$4^x + 2^x - 2 = 0$	$0$
48	$25^x - 2 \cdot 5^{x+1} + 25 = 0$	$1$
49	$2^{x+3} + 4^{x+1} = 320$	$3$
50	$e^{2x} + e^x - 2 = 0$	$0$
51	$3^{2x} - 4 \cdot 3^x + 3 = 0$	$0; 1$
52	$4^x - 6 \cdot 2^x - 16 = 0$	$3$
53	$9^x - 2 \cdot 3^x + 1 = 0$	$0$
54	$\left(\frac{1}{2}\right)^{2x} - 5 \left(\frac{1}{2}\right)^x + 4 = 0$	$-2; 0$
55	$20^{2x+1} + 2 = 9 \cdot 20^x$	<i>impossibile</i>
56	$3^{4\sqrt{x}} - 4 \cdot 3^{2\sqrt{x}} + 3 = 0$	$0; \frac{1}{4}$
57	$16^x - \frac{3}{2} 4^x + \frac{1}{2} = 0$	$-\frac{1}{2}; 0$

58	$\left(\frac{1}{3}\right)^{x-1} + \left(\frac{1}{3}\right)^{1-x} = 2$	1
59	$2^{3x-2} - 2^{3x-3} - 2^{3x-4} = 4$	2
60	$3^{2-x} + 3^{x+1} = 12$	0; 1
61	$3^{2x+1} - 28 \cdot 3^x + 9 = 0$	-1; 2
62	$10^{2x} + 3 \cdot 10^x + \frac{5}{4} = 0$	<i>impossibile</i>
63	$-2 \cdot 5^{x+2} + 25^{x+1} = 375$	1
64	$3^{x+2} + 3^{2-x} = 82$	-2; 2
65	$5^{x+2} - 4 \cdot 5^{1-x} - 30 = -5^{2-x}$	-1; 0
66	$4^{x+8} = \frac{1}{4^{2x-5}}$	-1
67	$\frac{5^{2x} - 125}{5^x - 1} = 0$	$\frac{3}{2}$
68	$3^{x+1} - 4 \cdot 3^{\frac{x}{2}} + 1 = 0$	-2; 0
69	$4^{x-1} - 3 \cdot 2^{x-1} - 4 = 0$	3
70	$\left(\frac{1}{4}\right)^{\frac{x+1}{3}} - 5 \left(\frac{1}{2}\right)^{\frac{x+1}{3}} + 4 = 0$	-7; 1
71	$\left(\frac{1}{4}\right)^{x^2-2x} - \left(\frac{1}{2}\right)^{\frac{2x^2-4x-1}{2}} = 0$	$\frac{2 \pm \sqrt{2}}{2}$

72	$\frac{4^x + 2^{x+1} + 11}{7} = 2^x + 1$	0; 2
equazioni esponenziali risolubili mediante l'uso di logaritmi		
73	$3^x - 4 = 0$	$\log_3 4$
74	$2^{\frac{x}{2}} - 3 = 0$	$2 \log_2 3$
75	$2^{x+1} = 3^x$	$\frac{\ln 2}{\ln 3 - \ln 2}$
76	$3^x = 5^{x-2}$	$\frac{2 \ln 5}{\ln 5 - \ln 3}$
77	$3 \left(\frac{1}{3}\right)^{4x} = 2$	$\frac{1 - \log_3 2}{4}$
78	$\left(\frac{3}{4}\right)^{3x} = 2$	$\frac{\log_3 2}{\frac{4}{3}}$
79	$2^x \cdot 3^x = 10$	$\frac{1}{\log_{10} 6}$
80	$3^x = 5^{3(x+1)}$	$\frac{3 \ln 5}{\ln 3 - 3 \ln 5}$
81	$25^x \cdot 7^{x-1} = 2$	$\frac{\ln 14}{\ln 175}$
82	$\frac{5^{2x}}{7^x} = 3$	$-\frac{\ln 3}{\ln 7 - \ln 25}$
83	$2e^{2x} + 5e^x = 3$	$\ln \frac{1}{2}$
84	$3^{x+1} = 2^{1-x}$	$\frac{\log 2 - \log 3}{\log 3 + \log 2}$
85	$3^{2x} - 3^{x+1} = -2$	0; $\frac{\ln 2}{\ln 3}$

86	$9^x - 3^{x+1} + 2 = 0$	$0; \frac{\ln 2}{\ln 3}$
87	$2^{2x} + 2^{x+1} - 1 = 0$	$\log_2(\sqrt{2} - 1)$
88	$\frac{3^{2x} - 3^{x+1}}{2} = -1$	$0; \frac{\ln 2}{\ln 3}$
89	$20 \cdot 7^x - 3 \cdot 2^x = 4 \cdot 7^x + 2^x$	$-2 \frac{\ln 2}{\ln 7 - \ln 2}$
90	$10^{x+3} - 2^{x+4} = 10^{x+2} - 2^x$	$-\frac{\ln 60}{\ln 5}$
91	$\frac{3}{4} \cdot 5^x + 7 \cdot 3^x = \frac{2}{3} \cdot 5^x + 10 \cdot 3^x$	$\frac{2 \ln 6}{\ln 5 - \ln 3}$
92	$3^{2x-1} + 3^{2x-1} = 2 \cdot 5^{2x-1}$	$\frac{1}{2}$
93	$3 \cdot 7^x + 4 \cdot 3^x = 7^x + 10 \cdot 3^x$	$\frac{\ln 6 - \ln 2}{\ln 7 - \ln 3}$
94	$5^{x+1} + 2^{x+1} = 3 \cdot 5^x + 5 \cdot 2^x$	$\frac{\ln 3 - \ln 2}{\ln 5 - \ln 2}$
95	$3^{\frac{2}{x-1}} = 5^{3(x+1)}$	$\pm \frac{\sqrt{3}}{3} \sqrt{\frac{\ln 1125}{\ln 5}}$
96	$5^{\frac{x+1}{2}} - 4 = 0$	$2 \log_5 4 - 1$
97	$7^{2x-1} - 14^{2x} = 0$	$-\frac{\ln 7}{\ln 4}$
98	$3^{2x} = 5 \cdot 2^x$	$\frac{\ln 5}{\ln 9 - \ln 2}$
99	$5^{3x+1} - 2 \cdot 3^x = 0$	$\frac{\ln 2 - \ln 5}{\ln 125 - \ln 3}$

100	$7 \cdot 2^{x-1} + 2^x = 3^x - 7 \cdot 3^{x+1}$	<i>impossibile</i>
101	$\left(\frac{1}{2}\right)^{-x} = 10^x - 2^{x+1}$	$\log_5 3$
102	$2 + 4^{\frac{x}{2}} = 3^{-x} + 2^x$	$-\frac{\ln 2}{\ln 3}$
103	$\left(\frac{3}{2}\right)^{x+1} = 2^x$	$\frac{\ln 3 - \ln 2}{\ln 4 - \ln 3}$
104	$3^{2x} \left(\frac{1}{2}\right)^x = 7$	$\frac{\ln 7}{\ln 9 - \ln 2}$
105	$4^{\frac{x}{2}} + 4^{2x} = 9^{x+1} + 2^x$	$\frac{\ln 9}{\ln 16 - \ln 9}$
106	$\left(\frac{2}{3}\right)^{-x+1} = 3$	$1 - \frac{\ln 3}{\ln 2 - \ln 3}$
107	$2^{1-x} = \frac{1}{\sqrt[3]{5}}$	$1 + \frac{\ln 5}{3 \ln 2}$
108	$\frac{3^{x+1}}{2} = 7^x 4^{-x}$	$\frac{\ln 3 - \ln 2}{\ln 7 - \ln 12}$
109	$5^{2\sqrt{x}} - 5^{\sqrt{x}+1} + 4 = 0$	$0; (\log_5 4)^2$
110	$\frac{2^{2x-3}}{4^{3x}} = \frac{3^x}{2}$	$-\frac{\ln 4}{\ln 48}$
111	$\frac{\sqrt[3]{2^x}}{\sqrt{3^{x+1}}} = 7$	$-\frac{3 \ln 147}{\ln 27 - \ln 4}$
112	$\frac{1}{7^{2x}} - \frac{1}{(7^x - 1)^2} = -\frac{2}{7^x - 7^{2x}}$	$-\frac{\ln 2}{\ln 49}$
<b>equazioni esponenziali di riepilogo</b>		
113	$\sqrt[x]{25} = \left(\frac{1}{5}\right)^{x-4}$	$2 \pm \sqrt{2}$



114	$2^{5x} \cdot 4^x = 1$	0
115	$4^x \sqrt{3^{2-x}} = 3^x \sqrt{2^{4x-1}}$	$\frac{2 \ln 108}{3 \ln 3 + 16 \ln 2}$
116	$3^{4-x} = \sqrt[5]{81^{3x-1} \cdot 27^x}$	$\frac{6}{5}$
117	$\frac{5 - 5^x}{5 + 5^x} - \frac{5 + 5^x}{5^x - 5} = -\frac{10}{3}$	$\frac{1}{\log 5}$
118	$a^{x-3} = \sqrt[x]{a^{10}} \quad a > 0$	-2; 5
119	$2^{3x+1} + 5^{2x+1} = 2^{3x+2} + 5^{2x}$	$\frac{\ln 2}{\ln 8 - 2 \ln 5}$
120	$\frac{5}{3} 3^x = 3 \frac{5^{2x-1}}{5^x}$	2
121	$\frac{(2^x + 5)^2}{5} - 5 = 2^x(2^x - 4)$	$\log_2 \frac{15}{2}$
122	$5^{x^2-7x+12} = 1$	3; 4
123	$\frac{10^{\frac{2x+2}{x}}}{3^x} = 1$	$\frac{1 \pm \sqrt{1 + \log 9}}{\log 3}$
124	$(\sqrt{a})^{x-1} = (a^{-1})^{x^2-x} \quad a > 0$	$-\frac{1}{2}; 1$
125	$a^{2x} - \sqrt{a} = 0 \quad a > 0$	$\frac{1}{4}$
126	$a^{\frac{3x-1}{2x}} - \frac{1}{a^2} = 0 \quad a > 0$	$\frac{1}{7}$
127	$3^{4x+2} - 37 \cdot 3^{2x} + 4 = 0$	-1; $\frac{\ln 2}{\ln 3}$

128	$10^{2\sqrt{x}-1} \cdot 0.1^{\sqrt{x}} = 4$	$(1 + \log 4)^2$
129	$3^{1-2x} - \frac{13}{3^x} = 3^{x+1} - 13$	0; $\pm 1$
130	$\frac{5^{\sqrt{3x+10}}}{5^x} = 5^4$	-3; -2
131	$25^{\sqrt{x+1}} = 5^{\sqrt{2x-5}}$	<i>impossibile</i>
132	$e^{\frac{x-1}{x^2}} = 1$	1
133	$\left(\frac{2}{3}\right)^{2(x^2-1)} + 2\left(\frac{2}{3}\right)^{x^2-1} - 3 = 0$	$\pm 1$
134	$\left(\frac{3^x + 3}{3^x - 4}\right)^2 - 5\left(\frac{3^x + 3}{3^x - 4}\right) = 0$	$\frac{\ln 23 - \ln 4}{\ln 3}$
135	$3^{1-x} = 16$	$1 - \log_3 16$
136	$2^{\frac{x+4}{1-x}} = \frac{1}{4}$	6
137	$\left(\frac{1}{2}\right)^{x+3} - 4 \cdot 64^x = 0$	$-\frac{5}{7}$
138	$\frac{1^{x+3}}{2} - 4 \cdot 64^x = 0$	$-\frac{1}{2}$
139	$2^{2x-1} \cdot 3^x = \frac{1}{2 \cdot 3^x}$	0
140	$3^{2x} - 3^{2x+3} + 9^{x+2} = 165$	$\frac{1}{2}$
141	$3(2^x + 1)^2 - 2(2^{2x} - 1) = 5(2^x - 1)^2$	2

142	$\left(\left(\frac{1}{4}\right)^{-x} - 16\right)\left(7^x - \frac{1}{49}\right) = 0$	$\pm 2$
143	$\left(\frac{4}{5}\right)^{\frac{x-2}{3}} - \sqrt{\frac{5}{4}} = 0$	$\frac{1}{2}$
144	$4^{1+x} - \frac{6}{4^{x-1}} = 20$	$\frac{\ln 6}{\ln 4}$
145	$3^{\frac{x+3}{2}} - 26(\sqrt{3})^{\frac{x+1}{2}} - 9 = 0$	7
146	$5 \cdot \left(\frac{1}{5}\right)^{-3x+1} = 25^{\frac{x}{2}} \cdot \left(\frac{1}{125}\right)^{\frac{x+1}{3}}$	$-\frac{1}{3}$
147	$3^{2x} + 3^{2x-1} = 4 + 9^x$	$\frac{\ln 12}{\ln 9}$
148	$(\sqrt[3]{5})^{2x+1} = 125$	4
149	$\left(\frac{1}{2}\right)^{2x^2-3} - 8 = 0$	0
150	$\frac{4^{x+2} - 2 \cdot 4^{x+1}}{2} = 16^{x+1}$	-1
151	$2 - \left(\frac{1}{5}\right)^{3x-1} = \frac{3\left(\frac{1}{5}\right)^{3x-1} - 4\left(\frac{1}{5}\right)^{\frac{3x-1}{2}} + 3}{2}$	$\frac{1}{3}$
152	$\frac{3^{\frac{2x-1}{3x}} \cdot 9^{-x}}{\sqrt{3}} = \left(\frac{1}{3}\right)^{x-1}$	<i>impossible</i>
153	$\left(\frac{1}{3}\right)^{\frac{2x(x-1)-3}{3}} + 2 \cdot \left(\frac{1}{3}\right)^{\frac{x(x-1)}{3}} = 1$	$\frac{1 \pm \sqrt{13}}{2}$
154	$2^{\frac{x^2-3x+10}{2}} - 2^{\frac{x^2-3x+14}{4}} - 8 = 0$	1; 2

155	$9^{\frac{1}{x}} - 10 \left(\frac{1}{3}\right)^{\frac{x-1}{x}} + 1 = 0$	$\pm 1$
156	$\left(2^{3x^2} - \frac{1}{4}\right) \left(3^{\frac{2x+3}{4}} - 9\right) = 0$	$\frac{5}{2}$
157	$(7 - 49^{x-1})(\sqrt{3} - 9^{2x-1}) = 0$	$\frac{3}{2}; \frac{5}{8}$
158	$\frac{1 + 2^{3x-1}}{2^x + \frac{1}{2}} = 2$	1
159	$\left(\frac{2}{3}\right)^{\sqrt{x}} \cdot 5 = \frac{1}{2}$	$\left(\frac{\ln 10}{\ln 3 - \ln 2}\right)^2$
160	$\frac{\sqrt{2}^{2-x} \cdot 4^{x-1}}{2^{1-2x}} = \frac{1}{2} \cdot 16^{-x}$	$\frac{2}{15}$
161	$a^x (1 - a^{3x+4}) = 0 \quad a > 0$	$-\frac{4}{3}$
162	$\left(a^{\frac{4x^2-4x+1}{2x}} - 1\right) \left(\frac{1}{a} - a^{2x^2}\right) = 0 \quad a > 0$	$\frac{1}{2}$
163	$\left(\sqrt[3]{a^{-2x}} - \frac{1}{a^{2x}}\right) \left(\frac{1}{a^3} - \frac{1}{a^{2x^2+1}}\right) = 0 \quad a > 0$	0; $\pm 1$
164	$(9^{2x} - 3) \left(\left(\frac{1}{2}\right)^x - 6 \cdot \left(\frac{1}{2}\right)^{\frac{x}{2}} + 8\right) = 0$	-4; -2; $\frac{1}{4}$
165	$\frac{\left(3^x - \frac{\sqrt{3}}{3}\right) \left(\left(\frac{1}{4}\right)^{x+1} - \left(\frac{1}{2}\right)^x\right)}{9^{2x} - 12 \cdot 3^{2x} + 27} = 0$	-2; $-\frac{1}{2}$
166	$\frac{4 \left(\frac{1}{4}\right)^{\frac{x+1}{3}} - 4 \left(\frac{1}{2}\right)^{\frac{x+1}{3}} + 1}{3^x - 9} = 0$	<i>impossibile</i>

$$167 \quad \frac{5^{2(x^2-1)} - 6 \cdot 5^{\frac{2x^2-3}{2}} + 1}{\left(\frac{1}{2}\right)^{\sqrt{x}} + \sqrt{2}} = 0$$

$$\frac{\sqrt{2}}{2}; \quad \frac{\sqrt{6}}{2}$$