

**Exercises of Exponential and logarithmic equations**


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1) Solve the following exponential equations:

a)  $5^{x^2 + 13x + 41} = 5$

c)  $4^x + 256 = 130 \cdot 2^x$

e)  $3^{x^2 - 6x + 9} = 81$

g)  $27 \cdot 9^x - 82 \cdot 3^x + 3 = 0$

i)  $3^{x^2 - 12x + 34} = 9$

b)  $3^{x-1} + 8 \cdot 3^x - 2 \cdot 3^{x+1} = 63$

d)  $2^{2x+6} = 2^9$

f)  $3^{x-1} + 8 \cdot 3^x - 5 \cdot 3^{x+1} = -180$

h)  $4^{5x+9} = \sqrt[4]{4^7}$

j)  $4^{x-2} + 7 \cdot 4^{x-1} + 8 \cdot 4^x = 157$

2) Solve the following logarithmic equations (where log is the logarithm base 10):

a)  $x = \log_5 \left( \frac{25}{\sqrt[8]{5^7}} \right)$

c)  $\log(9x - 8) - \log(6x - 7) = \log 90$

e)  $\log_x 8 = 3$

g)  $x = \log_5 \left( \frac{125}{\sqrt[5]{5}} \right)$

i)  $\log(3x + 9) - \log(4x - 9) = 3$

b)  $\log_x 16 = 2$

d)  $x = \log_6 \left( \frac{\sqrt[3]{6^2}}{216} \right)$

f)  $\log 3x - \log(8x - 5) = \log 75$

h)  $\log_x 64 = 3$

j)  $x = \log_5 \left( \frac{1}{\sqrt{5}} \right)$

**Answers:**

1) a)  $x_1 = -8, x_2 = -5$

c)  $x_1 = 1, x_2 = 7$

e)  $x_1 = 5, x_2 = 1$

g)  $x_1 = -3, x_2 = 1$

i)  $x_1 = 8, x_2 = 4$

2) a)  $x = \frac{9}{8}$

c)  $x = \frac{622}{531}$

e)  $x = 2$

g)  $x = \frac{14}{5}$

i)  $x = \frac{1287}{571}$

b)  $x = 3$

d)  $x = \frac{3}{2}$

f)  $x = 3$

h)  $x = \frac{-29}{20}$

j)  $x = 2$

b)  $x = 4$

d)  $x = \frac{-7}{3}$

f)  $x = \frac{125}{199}$

h)  $x = 4$

j)  $x = \frac{-1}{2}$