



## EQUACIONS AMB LOGARITMES

### 1. Resoleu:

a) $\log_x 32 = 5$	a) $x=2$	b) $\log_x 36 = 2$	b) $x=6$
c) $\log_x 81 = 2$	c) $x=9$	d) $\log_x 49 = 2$	d) $x=7$
e) $\log_x 5 = \frac{1}{2}$	e) $x=25$	f) $\log_x \frac{1}{16} = -4$	f) $x=2$
$\log_x \frac{1}{16} = -4 \rightarrow x^{-4} = 1/16 \rightarrow x^{-4} = 2^{-4} \rightarrow x=2$			
g) $\log_x 5 = -\frac{1}{2}$	g) $x=1/25$	h) $\log_x 32 = \frac{5}{2}$	h) $x=4$
i) $\log_x 0'01 = -2$	i) $x=10$	j) $\log_x 4 = -\frac{1}{2}$	j) $x=1/16$
k) $\log_x 216 = 3$	k) $x=6$	l) $\log_x 64 = 3$	l) $x=4$
$\log_x 64 = 3 \rightarrow x^3 = 64 \rightarrow x = \sqrt[3]{64} = 4$			

### 2. Resoleu:

a) $\log x = \log 5 - \log 2$	a) $x=5/2$	b) $\ln x = 2 \ln 3$	b) $x=9$
c) $1 + 2 \log x = 3$	c) $x=10$	d) $3 \log_3 x = -9$	d) $x=1/27$
$3 \log_3 x = -9 \rightarrow \log_3 x = -3 \rightarrow x = 3^{-3} \rightarrow x = 1/27$			

### 3. Resoleu:

a) $\log_2 16 = x$	a) $x=4$	b) $\log(10000) = x$	b) $x=4$
c) $\log_3 27 = x$	c) $x=3$	d) $\log_a x = 0$	d) $x=1$
e) $\log x = 2$	e) $x=81$	f) $\log_{16} 4 = x$	f) $x=1/4$



$\log_{16} 4 = x \rightarrow 16^x = 4 \rightarrow 4^{2x} = 4 \rightarrow 2x = 1 \rightarrow x = 1/2$
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**4. Resoleu:**

<b>a)</b> $\log_x 0'0001 = -4$	<b>a)</b> $x=10$	<b>b)</b> $\log_2 \frac{1}{32} = x$	<b>b)</b> $x=-5$	<b>c)</b> $\log_x 10 = \frac{1}{3}$	<b>c)</b> $x=10^3$
<b>d)</b> $\log_3 (3^2 \sqrt{3}) = x$	<b>d)</b> $x=5/2$	<b>e)</b> $\log 1 = x$	<b>e)</b> $x=0$	<b>f)</b> $\log_3 \sqrt{81} = x$	<b>f)</b> $x=2$
<b>g)</b> $\log_2 (\log_2 2^8) = x$	<b>g)</b> $x=3$	<b>h)</b> $\log_5 \sqrt{5} = x$	<b>h)</b> $x=1/2$	<b>i)</b> $\log_5 625 = x$	<b>i)</b> $x=4$
$\log_5 625 = x \rightarrow 5^x = 625 \rightarrow 5^x = 5^4 \rightarrow x = 4$					

**5. Resoleu:**

<b>a)</b> $\log x + \log 30 = 1$	<b>a)</b> $x=1/3$	<b>b)</b> $\log (2x) = \log 32 - \log x$	<b>b)</b> $x=4$
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**6. Resoleu:**

<b>a)</b> $\log x = \log 2$	<b>a)</b> $x=2$	<b>b)</b> $\log x = 3$	<b>b)</b> $x=1000$
<b>c)</b> $\log x = 5$	<b>c)</b> $x=100000$	<b>d)</b> $\log_2 (32^2) = x$	<b>d)</b> $x=10$
$\log_2 32^2 = x \rightarrow \log_2 2^{10} = x \rightarrow 10 = x \rightarrow x = 10$			
<b>e)</b> $\log x = 2 \log 3$	<b>e)</b> $x=9$	<b>f)</b> $\log x - \log 10 = 2$	<b>f)</b> $x=1000$
<b>g)</b> $4 \log_3 (2x - 5) = \log_3 81$	<b>g)</b> $x=4$	<b>h)</b> $\log_2 (x^2 + x + 2) = 2$	<b>h)</b> $x=1, x=-2$
$\log_2 \left( \frac{3x^2 + 5}{2x - 1} \right) = 3 \rightarrow \log_2 \left( \frac{3x^2 + 5}{2x - 1} \right) = \log_2 8 \rightarrow$			
$\frac{3x^2 + 5}{2x - 1} = 8 \rightarrow 3x^2 - 16x + 13 = 0 \rightarrow \begin{cases} x = 1 \\ x = 13/3 \end{cases}$			



**7. Resoleu:**

a) $\log(3x + 25) = 2$	a) $x = 25$	b) $\frac{5 - 3x}{x - 2} = \log 0'1$	b) $x = 3/2$
c) $\log_3(3x - 1) - \log_3(x + 1) = 2$	c) $x = -5/3$	d) $3 \log_2(x - 1) = \log_2 8$	d) $x = 3$
e) $\log 3 + \log(x - 1) = \log(2x)$	e) $x = 3$	f) $\log \frac{x}{100} = \log 10^4 - \log x$	f) $x = 1000$
$\log \frac{x}{100} = \log 10^4 - \log x \rightarrow \log \frac{x}{100} = \log \frac{10000}{x} \rightarrow$ $x^2 = 1000000 \rightarrow \begin{cases} x = 1000 & \text{si} \\ x = -1000 & \text{no} \end{cases}$			

**8. Resoleu:**

a) $\log_3 9 = x$	a) $x = 2$	b) $\log_x(1/8) = -3$	b) $x = 2$
c) $\log_2 x = 5$	c) $x = 32$	d) $\log_3(\sqrt{3}/9) = x$	d) $x = -3/2$
e) $\log_x 5 = -2$	e) $x = 1/\sqrt{5}$	f) $\ln(1/e^2) = x$	f) $x = -2$
$\ln \frac{1}{e^2} = x \rightarrow \ln e^{-2} = x \rightarrow -2 = x \rightarrow x = -2$			
g) $\log_9(\sqrt{3}/3) = x$	g) $x = -1/4$	h) $\log_{(1/2)} 8 = x$	h) $x = -3$
i) $\log_3 x^4 = 8$	i) $x = 9$	j) $\log x + \log 2 = \log 5$	j) $x = 5/2$
k) $\log_{1/2} 2^3 = x$	k) $x = -3$	l) $\log x - 1 = 2$	l) $x = 1000$
$\log x - 1 = 2 \rightarrow \log x = 3 \rightarrow x = 10^3 \rightarrow x = 1000$			

**9. Resoleu:**

a) $\log \sqrt{x + 4} - \log(3x) = -2 \log 3$	a) $x = 12$
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<b>b)</b> $\ln x - \ln (x-2) = \ln (4x-3) - \ln 3$	<b>b)</b> $x=3$
<b>c)</b> $\log (x-2) - \log (x^2) = -\log (3x)$	<b>c)</b> $x=3$
$\log(x-2) - \log x^2 = -\log(3x) \rightarrow \log \frac{x-2}{x^2} = \log \frac{1}{3x} \rightarrow$ $3x(x-2) = x^2 \rightarrow 3x^2 - 6x = x^2 \rightarrow 2x^2 - 6x = 0$ $\rightarrow \begin{cases} x=0 & \text{no} \\ x=3 & \text{si} \end{cases}$	
<b>d)</b> $2 \log x - \log (2x) = \log (x-1)$	<b>d)</b> $x=2$
<b>e)</b> $\ln (x^2+2) - \ln (x+1) = \ln(2-x)$	<b>e)</b> $x=0$
<b>f)</b> $3 \log x - 2 \log 2 = \log (x^2) - \log 2$	<b>f)</b> $x=2$
$3 \log x - 2 \log 2 = \log x^2 - \log 2 \rightarrow \log x^3 - \log 2^2 = \log x^2 - \log 2$ $\rightarrow \log \frac{x^3}{2^2} = \log \frac{x^2}{2} \rightarrow 2x^3 = 4x^2 \rightarrow \begin{cases} x=0 & \text{no} \\ x=2 & \text{si} \end{cases}$	

**10. Resoleu:**

<b>a)</b> $\log_{27} 3 = x$	<b>a)</b> $x=1/3$	<b>b)</b> $\log_2 \sqrt[3]{32} = x$	<b>b)</b> $x=5/3$
<b>c)</b> $\log_x 7 = \frac{1}{2}$	<b>c)</b> $x=49$	<b>d)</b> $\log_3 \frac{81}{x} = 3$	<b>d)</b> $x=3$
<b>e)</b> $\log_x 32 = \frac{5}{2}$	<b>e)</b> $x=4$	<b>f)</b> $\log_{\sqrt{1000}} x = 0$	<b>f)</b> $x=1$
$\log_{\sqrt{1000}} x = 0 \rightarrow \sqrt{1000}^0 = x \rightarrow x=1$			
<b>g)</b> $\log_{49} \sqrt{7} = x$	<b>g)</b> $x=1/4$	<b>h)</b> $\log_2 \frac{x}{4} = -2$	<b>h)</b> $x=1$
<b>i)</b> $\log_x \sqrt{81} = 2$	<b>i)</b> $x=3$	<b>j)</b> $\log_3 \frac{\sqrt{x}}{9} = -1$	<b>j)</b> $x=9$
<b>k)</b> $\log_5 \frac{100}{x} = 2$	<b>k)</b> $x=4$	<b>l)</b> $\log_{\sqrt{x}} 9 = 2$	<b>l)</b> $x=9$



$$\log_{\sqrt{x}} 9 = 2 \quad \rightarrow \quad (\sqrt{x})^2 = 9 \quad \rightarrow \quad x = 9$$

### 11. Resoleu:

a) $\ln(x-1) - \ln(x^2-1) = \ln\left(\frac{1}{3}\right)$	a) $x=2$
b) $\ln\left(\frac{x+1}{x}\right) + \ln 2 = \ln(x+3)$	b) $x=1$
c) $\log(x+1) + \log(x-2) = \log(2-x)$	c) $x=-1, x=2$
d) $2 \log(x-1) = 2 \log 2$	d) $x=-1, x=3$
e) $\log(x+1) - \log\sqrt{x-1} = \log(x-2)$	e) $x=5$
f) $\log x + \log(x+2) = \log(4x-1)$	f) $x=1$
$\log x + \log(x+2) = \log(4x-1) \quad \rightarrow \quad \log x(x+2) = \log(4x-1)$ $\rightarrow \quad x^2+2x = 4x-1 \quad \rightarrow \quad x^2-2x+1=0 \quad \rightarrow \quad \begin{cases} x=1 & \text{si} \\ x=1 & \text{si} \end{cases} \rightarrow \quad x=1$	