

5.7 Solving Exponential and Logarithmic Equations

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11:42 AM

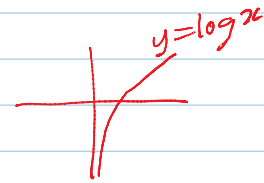
Logarithmic:

Solve $2 \log x = \log 36$

$$\log x^2 = \log 36$$

Domain: $x > 0$

$\therefore x^2 = 36$
 $x = \pm 6$ but $x > 0$
so $x = 6$



Solve $\log(8x+4) = 1 + \log(x+1)$
 $\log(8x+4) = \log_{10} 10 + \log(x+1)$
 $\log(8x+4) = \log[10(x+1)]$

$\therefore 8x+4 = 10(x+1)$
 $8x+4 = 10x+10$
 $-6 = 2x$
 $x = -3$ reject (not $> -\frac{1}{2}$)

\therefore no solution

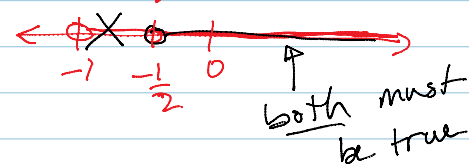
$$8x+4 > 0$$

$$8x > -4$$

$$x > -\frac{1}{2}$$

$$x+1 > 0$$

$$x > -1$$



Alternate method:

$$\log(8x+4) = 1 + \log(x+1)$$

$$\log(8x+4) - \log(x+1) = 1$$

$$\log_{10} \left(\frac{8x+4}{x+1} \right) = 1$$

Exponential form: $10^1 = \frac{8x+4}{x+1}$

$$10(x+1) = 8x+4 \quad \therefore$$

Exponential Equations:

Solve $3(2)^{x+1} = 5$

* No domain restrictions

for exponential eq's ☺

$$\log 3(2)^{x+1} = \log 5$$

$$\log 3 + \log 2^{x+1} = \log 5$$

$$\log 3 + (x+1)\log 2 = \log 5$$

$$\log 3 + x\log 2 + \log 2 = \log 5$$

* Break up multiplication
first

* Brackets around coefficient

$$\frac{x\log 2}{\log 2} = \frac{(\log 5 - \log 3 - \log 2)}{\log 2} \approx -0.26$$

Solve

$$a) \log_2 x = 5 + \log_2 3$$

$$x = 96$$

$$b) 4(7)^{x+2} = 9^{2x-3}$$

$$x = \frac{\log 4 + 2\log 7 + 3\log 9}{2\log 9 - \log 7}$$