7.5 continued more things to do with logs!

solve for x:

$\log_3(x^2+7x-5)=\log_3(6x+1)$

well, if there is one SINGLE log on the right side and one SINGLE log on the left side of the equation, and the logs are the SAME base, then the polynomials in the ( ) must be equal.

so:

$\log_3(x^2+7x-5)=\log_3(6x+1)$

$x^2+7x-5=6x+1$

$x^2+x-5=1$

$x^2+x-6=0$

$(x+3)(x-2)=0$

$x=-3$ *or* $x=2$

check!!! Since we can only take the Log of positive numbers (not Zero and not Negatives) we must check our answer.

Check! **(Always check in the original problem)**

Teacher Note:
Scroll down for check

x= -3

$\log_3(9-21-5)=\log_3(-18+1)$

$\log_3(-17)=\log_3(-17)$

can't take the log of a negative so x=-3 is an extraneous solution...it is no good

x=2

$\log_3(4+14-5)=\log_3(12+1)$

$\log_3(13)=\log_3(13)$ ☺

The only good solution is x=2

solve for x, be sure to check

one to one

2. $\log_b 8=\log_b x+\log_b(x-2)$

Hint: First make it so there is one **single** log on the left side and one single log on the right

$\log_b 8=\log_b[x(x-2)]$

$8=x(x-2)$

$8=x^2-2x+1$

$9=(x-1)^2$

$\pm 3=x-1$

$1\pm 3=x$

$4=1+3=x$

$-2=1-3=x$

$x=4,-2$

checking answer

$\log_b 8=\log_b(-2)$

doesn't work!

3. $2\log_3 x = \log_3 4$ Hint: use the power→exponent rule

$\log_3 x^2 = \log_3 4$

$x^2 = 4$

$x = \pm 2$

Checking in ORIGINAL

$2\log_3(-2) \neq \log_3 4$

not possible!

SO $x = 2$

solve for x, be sure to check

4. $\log_7(x^2 - 1) = \log_7 8$

$x^2 - 1 = 8$

$x^2 - 9 = 0$

$(x+3)(x-3) = 0$

$x+3=0$ or $x-3=0$

$x = -3$ or $x = 3$

Checking

$\log_7((-3)^2 - 1) = \log_7 8$

$\log_7 8 = \log_7 8$ ✓

$\log_7(3^2 - 1) = \log_7 8$

$\log_7 8 = \log_7 8$ ✓

5. $2\log_2(x+2) = \log_2(3x+16)$

Use power property

$\log_2(x+2)^2 = \log_2(3x+16)$

$(x+2)^2 = 3x+16$

$x^2+4x+4 = 3x+16$

$-3x-16 \quad -3x-16$

$x^2+x-12=0$

$(x+4)(x-3)=0$

$x+4=0$ or $x-3=0$

$x=-4 \qquad x=3$

check

$2\log_2(-4+2) = \log_2(3(-4)+16)$

nope

$2\log_2(-2) = \log_2 4$

not possible so $\boxed{x=3}$

6. $\log(3x+2) = \log(x-8)+1$

$\log(3x+2) - \log(x-8) = 1$

$\log\left(\frac{3x+2}{x-8}\right) = 1$

$10^1 = \frac{3x+2}{x-8}$ go to exp form!

$\frac{10}{1} = \frac{3x+2}{x-8}$

solve the proportion

$10(x-8) = 3x+2$

$10x-80 = 3x+2$

$-3x+80 \quad -3x+80$

$\frac{7x}{7} = \frac{82}{7}$

and check that this is not an extraneous solution...