Logarithm

8/29/2023

$\log_2 x+5 + \log_2 x+1 + \log_2 8 = 8$

First set all to $\log_2$

$= \log_2 x+5 + \log_2 x+1 + \log_2 8 = 8 \cdot \log_2 2$

$= \log_2 x+5 + \log_2 x+1 + \log_2 8 = \log_2 2^8$

Since they are all with the same log base, you can now simplify by multiplying ($\log_2$)

$= (x+5)(x+1)(8) = 2^8$

$= x^2 + x + 5x + 5(8) = 2^8$

$= 8x^2 + 8x + 40x + 40 = 2^8$

$= 8x^2 + 48x + 40 = 2^8$

$= 8x^2 + 48x + 40 = 256$ (Now simplify by dividing by 8)

$= \frac{8x^2}{8} + \frac{48x}{8} + \frac{40}{8} = \frac{256}{8}$

$= x^2 + 6x + 5 = 32$

$= x^2 + 6x + 5 - 32 = 0$

$= x^2 + 6x - 27 = 0$

(Now factorise)

$x - 3 = 0$

$x = 3$