Solving Log Equations including finding zeroes

When solving a logarithmic equation, we use the equivalence.

$$\log_c p = q \iff p = c^q$$

Ex:

$3\log_2(2x-4)-5=4$

$2x-4>0$

$\boxed{x>2}$

$3\log_2(2x-4)=4+5$

$3\log_2(2x-4)=9$

$\log_2(2x-4)=3$

$2x-4=2^3$

$2x-4=8$

$2x=12$

$x=6$

is $x>2$

answer YES

Steps.

1) Determine Restrictions

2) isolate the log.

3) Use equivalence to Remove log.

4) Solve for x

5) Verify your solution does not violate the restriction.

Bad Ex:-

$$3\log_{10}(4(x-10)) + 25 = 0$$

Find the zero

$$3\log_{10}(4(x-10)) = -25$$

$$\log_{10}(4(x-10)) = \frac{-25}{3}$$

$$\log_{10}(4(x-10)) = -8.\overline{33}$$

$$4(x-10) = 10^{-8.\overline{33}}$$

$$4(x-10) = 4.64 \times 10^{-9}$$

$$x - 10 = \frac{4.64 \times 10^{-9}}{4}$$

x= 10.000000001160397297

Rest:

$x-10>0$

$x>10$

$f(x) = \log_3 0.5(x-2)$

$x-2 > 0$

$x > 2$

$\log_3 0.5(x-2) = 0$

$0.5(x-2) = 3^0$

$0.5(x-2) = 1$

$x-2 = \frac{1}{0.5}$

$x-2 = 2$

$x = 2+2$

$x = 4$

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Q7, 8, 9

(e) $5\log_2(x^2+3x-2)-10=5$

Restriction

$x^2+3x-2>0$

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

$x^2+3x-2=2^3$

$x^2+3x-2=8$

$x^2+3x-10=0$

$x^2+5x-2x-10=0$

$x(x+5)-2(x+5)=0$

$(x+5)(x-2)=0$

$x=-5$ $x=2$