Lesson 6 Solving Logarithmic Equations

Steps:

- 1. Move all logs to one side and leave the constant (or 0) on other side. If all terms have logs, no need to isolate (see example 1).
- 2. Combine all logs into a single log using log laws.
- 3. Change to exponential form
- 4. Solve
- 5. Check your solution, extraneous roots may exist
 - ➤ Logs are only defined for positive (+) arguments, if a solution yields a negative (-) or 0 argument, reject that solution.

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Ex. 1) Solve.

a) log_3(2x) = log_3(x+5)

Single log on each side

arguments must be equal

2x = x+5

2x = x+5

3x = x+5

with common bases)

* check to make sure x=5 won't make either argument

On negative.

2x = x+5

3x = x+5

3x = x+5

3x = x+5

3x = x+5

* check to make sure x=5 won't make either argument

3x = x+5

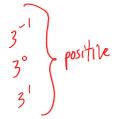
is a valid solution
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b)
$$\log_3(9x) + \log_3 x = 4$$

log₃
$$(9x^2) = 4$$
 Product law
$$3^4 = 9x^2$$
 Exponential form
$$81 : 9x^2$$



c)
$$\log_5(3x+1) + \log_5(x-3) = 3$$

$$5^3 : 3x^2 - 8x - 3$$

$$0 = 3x^2 - 8x - 188$$

$$5 - \frac{24}{16}$$

$$\rho -384$$
 0: $(3x+16)(x-8)$
 $S -8$ $\times = \frac{-16}{3}$ $\times = 8$
 $F - \frac{24}{3}, \frac{16}{1}$ rej

$$5^3: 3x^2-8x-3$$
 Put in exponential form

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d)
$$\log(6x) = \log(x+6) + \log(x-1)$$

 $\log(6x) = \log((x+6)(x-1))$
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 $\log(6x) = \log(x+6) + \log(x-1)$
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Product law to combine logs Single log on both sides, so equate arguments

e exact value

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Enrichment

f)
$$x^{\log x} = 100x$$

thank to $\log_x 100x = \log_x x$
 \log