Title: Feb 18-7:31 AM (1 of 2)

Algebra 2 Trig
U10.7 Solving Logarithms using Inverse NOTES

Solving Exponential Equations (What if the bases can’t be made to be the same?)

Solve

1. \(2^x = 5\)
   \[
   \frac{\log 5}{\log 2} = \frac{2.322}{1} \quad \text{Exact} \quad \text{Decimal}
   \]
   \[x = \log_2 5 = 2.322\]

2. \(5^x = 11\)
   \[
   \frac{\log 11}{\log 5} = 1.490
   \]

3. \(12^x + 2 = 10\)
   \[
   \frac{\log 10 - 2}{\log 12} = 0.837
   \]

4. \(2^x \cdot 5^x = 16\)
   \[
   \frac{\log 16}{\log 2} = \frac{4}{1} \quad \text{Exact} \quad \text{Decimal}
   \]

5. \(3^x = 7 - 4x\)
   \[
   \frac{\log 7}{\log 3} - 4x = 0.443
   \]

6. \(11^{x+2} = 15\)
   \[
   \frac{\log 15}{\log 11} = x + 2
   \]

7. \(15^{-2x} = 8\)
   \[
   \frac{\log 8}{\log 15} = -2x
   \]

Steps to Solve:
- Isolate the base and exponent
- Change to log form
Solving logarithms: Make sure to check for extraneous solutions!

8. \( \log_2 x = 5 \)
   \[
   2^5 = x \\
   32 = x
   \]

Steps to Solve:
Isolate the log
Change to Exp. Form

9. \( \ln 2x = 6 \)
   \[
   \log_e 2x = 6 \\
   \frac{e^6}{2} = 2x \\
   201.714 = 2x
   \]

10. \( \log 5 + \log x = 2 \)
    \[
    \log_{10} 5x = 2 \\
    10^2 = 5x \\
    \frac{100}{5} = x \\
    20 = x
    \]

11. \( \log_4 x - \log_4 3 = 2 \)
    \[
    \log_4 \frac{x}{3} = 2 \\
    4^2 = \frac{x}{3} \\
    16 = \frac{x}{3} \\
    48 = x
    \]

12. \( \log_3 x^2 + \log_3 4 = 2 \)
    \[
    \log_3 4x^2 = 2 \\
    3^2 = 4x^2 \\
    \frac{9}{4} = x^2 \\
    \pm \frac{3}{2} = x
    \]

13. \( \ln (2x)^2 = 4 \)
    \[
    \ln 2^2 x^2 = 4 \\
    (e^4)^2 = 2^2 x^2 \\
    5.225
    \]

14. \( \log_5 \frac{x}{10} = -1 \)
    \[
    5^{-1} = \frac{x}{10} \\
    0.1 = \frac{x}{10} \\
    2 = x
    \]