5.4B Logarithmic Equations

- Solving Logarithmic Equations
  - Method of Converting to an Exponential
    - Method of Converting to an Exponential in Symbols and Words
      1. Recognize a logarithmic equation with the logarithm on one side. $[y = \log_b x]$
      2. Convert to an exponential equation using the following equivalence. $[b^y = x]$
      3. Solve the remaining equation by isolating x.
    - Examples of Solving Logarithmic Equations
      - Example 1: $\log_2(1 - 2x) = 3$
      - Example 2: $\log_5(x + 6) + \log_5(x + 2) = 1$
      - Example 3: $\log_3 x^2 = 4$

▼ Example 4: $\log_4 x = 3$

▼ Example 5: $\log_5(x-3) = 2$

▼ Example 6: $2\ln x = 8$

▼ Example 7: $\log_2 x + \log_2(x-2) = 3$

▼ Method of Using the Property of Equality or the One-to-One Property

▼ Method in Symbols

1. Recognize a logarithmic equation with logarithms of the same base on both sides. $[\log_b u = \log_b v]$
2. Apply the property of equality or one-to-one property which states that if you have logarithms of the same base on both sides the expressions inside the logarithms must be equal. $[u = v]$
3. Solve the remaining equation.

▼ Examples of Solving Logarithmic Equations

▼ Example 1: $\log_5(x-4) = \log_5 6$

▼ Example 2: $2\log_5 x = \log_5 9$

▼ Example 3: $\log_3 2 + \log_3(x-3) = \log_3 10$

▼ Example 4: $\log(x+3) + \log(x-2) = \log 14$

▼ Example 5: $\ln x + \ln(x-4) = \ln(x+6)$