4.4: Properties of Logarithms

Supplementary Notes

For $m, n, a > 0$, $a \neq 1$, and real number p the following properties hold

- Identity Properties:
  - $\log_a 1 = 0$
  - $\log_a a = 1$
- Product-sum property:
  - $\log_a(mn) = \log_a m + \log_a n$
- Quotient-difference property:
  - $\log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$
- Power property:
  - $\log_a n^p = p \log_a n$
- Change-of-base property:
  - $\log_a n = \frac{\log_b n}{\log_b a}$

Exercises

1. Evaluate $e^{\ln 6 + 2\ln 3}$.
2. Evaluate $e^{5\ln 2 - \ln 3}$.
3. If $\ln y = 5x - \ln 3$, then $y =$
4. If $\ln y = \ln x + 2\ln 3$, then $y =$
5. If $\log_4 2 = a$ and $\log_4 3 = b$, then $\log_4 54 =$
6. If $\log_6 3 = a$ and $\log_6 4 = b$, then $\log_6 \frac{16}{3} =$
7. Expand $\ln\left(\frac{\sqrt[4]{x-5}y^{-2}}{z^3}\right)$.
8. $5\log z - \frac{1}{3}\log y + 2\log x =$