8.2 Transformations of Logarithmic Functions

A Transformations of Logarithmic Functions

The function:

\[ g(x) = A \log_b B(x-C) + D \]

is a transformation of the parent function \( f(x) = \log_b x \).

Here are some features of the function \( g(x) \):

- **Domain:**
  - If \( B > 0 \) then \( D = (C, \infty) \)
  - If \( B < 0 \) then \( D = (-\infty, C) \)

- **Range:** \( R \)

- **Vertical Asymptote:** \( x = C \)

Ex 1. For each case, use three key points to graph the logarithmic function. Specify the \( x \)-intercept, \( y \)-intercept, domain, range, and the equation of the vertical asymptote.

a) \( y = -\log_2(x-3) \)

b) \( y = 2 \log_{0.5} x - 4 \)
c) \( y = 1 - \log_3(\frac{x}{2}) \)

d) \( y = -2\log_{0.5}(2x - 4) + 4 \)

Ex 2. Graph on the same grid \( y = \log_2 x \), 
\( y = \log_2 (2x) \), and \( y = 1 + \log_2 x \).

Ex 3. Graph on the same grid \( y = \log_2 x \), \( y = \log_2 |x| \), 
and \( y = |\log_2 x| \).

Reading: Nelson Textbook, Pages 452-457
Homework: Nelson Textbook, Page 457: #4, 5, 6, 7, 8, 9, 11