4.3-Logarithmic Functions

Definition: A logarithmic function is defined as follows:
If \( y = \log_a x \), then

\[ y = \ln x \] implies

Properties of Logarithms:

\[ \log_a (XY) = \]

\[ \log_a \left( \frac{X}{Y} \right) = \]

\[ \log_a (X^n) = \]

Examples:

Rewrite \( \log_4 16 = 2 \) as an exponential equation.

Compute \( \log_2 \frac{1}{32} \)

Compute \( \log_9 27 \)
Given $\log_5 x = -3$, find $x$

Rewrite $\ln X - 2 \ln Y + \frac{1}{2} \ln Z$ as a single logarithm

Compute $5 \log 2 + 2 \log 5 - \log 8$

Find the inverse of $f(x) = e^{\frac{1}{x}}$
Graphs of Logarithmic Functions:

Examples:

Solve for $x$: $\log(2 - x) + \log(5 - x) = 1$

$$
\lim_{x \to -\infty} \ln(e^x + e^{-x}) - \ln(2e^x + e^{-x})
$$
The formula to compute the amount of money $A$ in an account earning $100r\%$ interest compounded $m$ times per year after $t$ years is $A = P \left(1 + \frac{r}{m}\right)^{mt}$. If 10,000 QR are kept at 6% per year compounded monthly, when will the account have 15,000 QR?

The *Change of Base* formula:

**On Your Own:** 4.3 #1-4,10,14,25,28,30,37,39,46,53,61,63,65,70,75