# Review Exercise Set 15

Exercise 1: Convert the following exponential expression into its equivalent logarithmic form.

$64 = 2^{x-1}$

Exercise 2: Evaluate the given expression without using a calculator.

$\log_7 \frac{1}{343} =$

Exercise 3: Graph the given logarithmic function by using transformations.

$g(x) = \ln (x + 1)^{-2} - 2$

Exercise 4: Find the domain of the given logarithmic function.

$h(x) = \ln (6x^2 - 13x - 5)$

Exercise 5: If the decibel level of a sound hear by a human is given by the logarithmic function $D = 10\log(10^{12}I)$, where $I$ is the intensity of the sound in watts per square meter ($W/m^2$), find the decibels associated with an alarm clock with a sound intensity of $1 \times 10^{-3}$ $W/m^2$.

# Review Exercise Set 15 Answer Key

Exercise 1: Convert the following exponential expression into its equivalent logarithmic form.

$64 = 2^{x-1}$

$\log_2 64 = x - 1$

Exercise 2: Evaluate the given expression without using a calculator.

$$\begin{aligned}\log_7 \frac{1}{343} &= \log_7 \frac{1}{7^3} \\ &= \log_7 7^{-3} \\ &= -3\log_7 7 \\ &= -3(1) \\ &= -3\end{aligned}$$

Exercise 3: Graph the given logarithmic function by using transformations.

$g(x) = \ln (x + 1)^{-2} - 2$

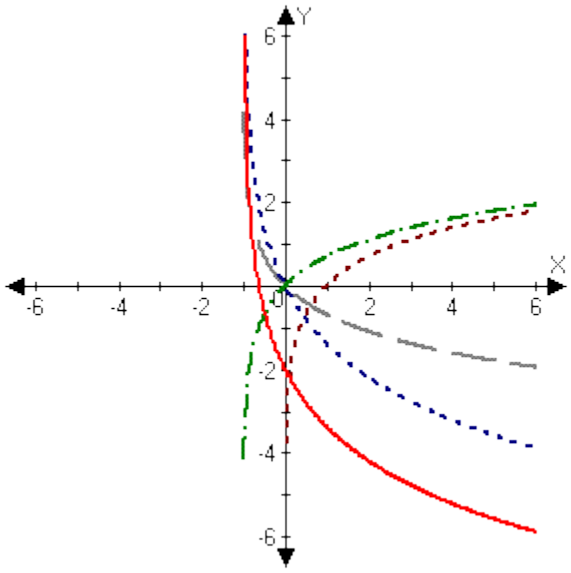
Rewrite the function

$g(x) = -2 \ln (x + 1) - 2$

Graph using transformations

ln (x) -- basic function (maroon dashed graph)
ln (x + 1) -- horizontal shift left 1 unit (green dashed graph)
-ln(x + 1) -- reflection about x-axis (grey dashed graph)
-2 ln(x + 1) -- vertical stretch (dark blue dashed graph)
-2 ln(x + 1) - 2 -- vertical shift down 2 units (solid red graph)

Exercise 3 (Continued):




Exercise 4: Find the domain of the given logarithmic function.

$h(x) = \ln (6x^2 - 13x - 5)$

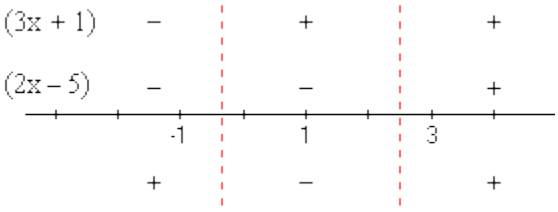
Apply domain restriction for logarithms

$6x^2 - 13x - 5 > 0$

Replace inequality with equal sign and solve for x

$6x^2 - 13x - 5 = 0$
$(3x + 1)(2x - 5) = 0$
$3x + 1 = 0$ or $2x - 5 = 0$
$3x = -1$ or $2x = 5$
$x = -\frac{1}{3}$ or $x = \frac{5}{2}$

Setup the intervals on a number line and determine the signs in each interval




The domain will be the positive interval(s)

The domain is $\left(-\infty, -\frac{1}{3}\right) \cup \left(\frac{5}{2}, \infty\right)$

Exercise 5: If the decibel level of a sound hear by a human is given by the logarithmic function $D = 10\log(10^{12}I)$, where $I$ is the intensity of the sound in watts per square meter ($W/m^2$), find the decibels associated with an alarm clock with a sound intensity of $1 \times 10^{-3}$ $W/m^2$.

$D = 10 \log (10^{12}I)$
$D = 10 \log [(10^{12})(1 \times 10^{-3})]$
$D = 10 \log (10^{9})$
$D = 10 (9)$
$D = 90$