Worksheet 10 – Logarithmic Functions (§5.3)

1. Convert the following equations from logarithmic form into exponential form.

(a) $\log_5(625) = 4$ **(c)** $\log_2\left(\frac{1}{32}\right) = -5$ **(e)** $\log_{1/2}(8) = -3$

(b) $\log_7(49) = 2$ **(d)** $\log(1000) = 3$ **(f)** $\log_C(D) = E$

2. Convert the following equations from exponential form into logarithmic form.

(a) $2^6 = 64$ **(c)** $10^4 = 10{,}000$ **(e)** $e^0 = 1$

(b) $\left(\frac{1}{4}\right)^{-2} = 16$ **(d)** $3^{-2} = \frac{1}{9}$ **(f)** $F^G = H$

3. Fill in the blank.

(a) $\log_{\square}\left(\frac{1}{81}\right) = -2$ **(c)** $\log_{\square}\left(\frac{1}{9}\right) = 2$ **(e)** $\log(\square) = -4$

(b) $\log_5(\square) = 3$ **(d)** $\log_8(\square) = 0$ **(f)** $\ln(\square) = 1$

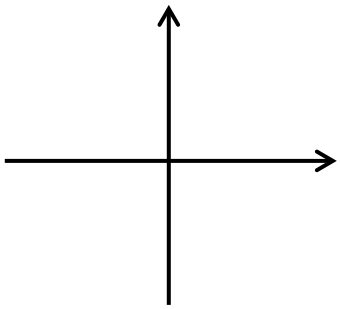
4. Compute the following logarithmic expressions.

(a) $\log_3(9)$ **(c)** $\log_{49}(7)$ **(e)** $\log(100)$

(b) $\log_{1/3}(27)$ **(d)** $\log_4\left(\frac{1}{64}\right)$ **(f)** $\ln(\sqrt{e})$

5. Sketch the graph of the following basic functions and then state their domain, range, and asymptote.

$f(x) = \log_b(x), b > 1$

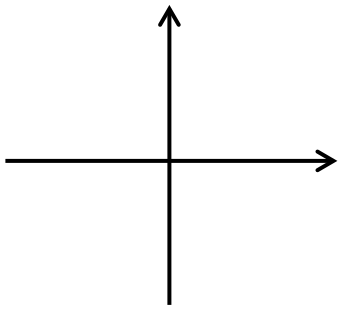


Domain:

Range:

Asymptote:

$f(x) = \log_b(x), 0 < b < 1$



Domain:

Range:

Asymptote:

6. Compute the domain of the following functions.

(a) $f(x) = \log_2(6 - 2x)$

(b) $f(x) = \log_{1/3}(3x + 12)$

(c) $f(x) = \log_4(x^2 - 4)$

(d) $f(x) = \log(7 - x) + \log(x - 4)$

(e) $f(x) = \ln(x^2 + 1)$

(f) $f(x) = \sqrt{\ln(x)}$

7. Sketch the graph of the following functions using transformations. For partial credit, start with the basic graph of each function and graph/label each stage of its transformation. Then state its domain, range, and asymptote.

(a) $f(x) = \log_2(x + 1) + 1$

(b) $f(x) = \log_{1/3}(x - 1) - 1$

(c) $f(x) = -\ln(x - 2) + 1$

(d) $f(x) = -2 + \log_5(-x)$

8. Compute the inverse of the following invertible functions.

(a) $f(x) = \frac{1}{2} \cdot 6^{x-3}$

(b) $f(x) = \log_2(x - 1) + 4$

(c) $f(x) = e^{2x-1} - 3$

(d) $f(x) = -\log_3(x + 2) - 3$