

Semester 1 Review – Part 4: Logarithms. You may use calculators on these problems

Exponential and Logarithm Properties:

$$a^x = b \Leftrightarrow x = \log_a b$$

$$\log_c a + \log_c b = \log_c ab$$

$$\log_c a - \log_c b = \log_c \frac{a}{b}$$

$$\log_c a^r = r \log_c a$$

$$\log_b a = \frac{\log_c a}{\log_c b}$$

1) Write each of the following using a single logarithmic expression, or, if possible, without any logarithms.

a. $\log(5) - 4\log(x) =$

b. $\log_2(16^a) =$

2) Given that $X = \log_a(2)$, $Y = \log_a(3)$ and $Z = \log_a(5)$ write the expressions below in terms of X, Y and Z. Your results should not have any logarithms in them.

a. $\log_a(15) =$

b. $\log_a\left(\frac{4}{\sqrt{3}}\right) =$

3) Solve for the value of x in the equation: $\log_4(3x + 5) = 2$

4) Solve the equation $\log_2(x) + \log_2(x - 2) = 3$, for $x > 2$.

5) a) Given the function $f(x) = \log_3(\sqrt{x})$, show that $f^{-1}(x) = 3^{2x}$.

b) What is the Range of $f^{-1}(x)$?

c) Given that $g(x) = \log_3(x)$, find $(f^{-1} \circ g)(2)$. Write your answer as an integer.

6) Simplify each of the following to a Rational Number or Solve for x .

a) $\log_x(x^2 \cdot \sqrt[5]{x}) =$

b) $\log_2(x) = 3$

7) Given that $(2^x)^2 + (2^x) - 12$ can be written as $(2^x + a)(2^x + b)$ where a and b are integers, find the value of a and of b .

Hence find the exact solution of the equation $(2^x)^2 + (2^x) - 12 = 0$, and explain why there is only one solution.

8) Let $f(x) = \log_a(x)$

a. Write down the value of:

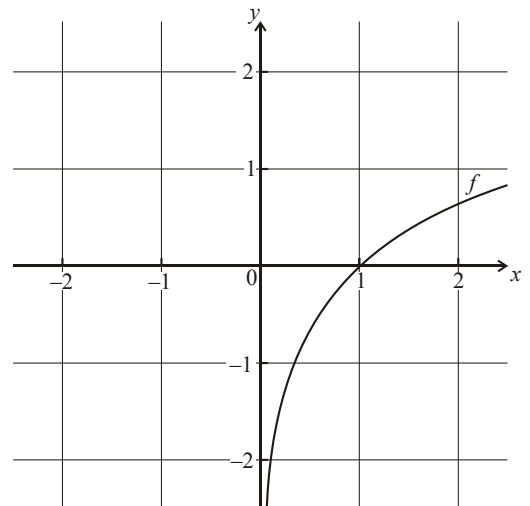
i. $f(a) =$ _____

ii. $f(1) =$ _____

iii. $f(a^4) =$ _____

b. The diagram on the right shows part of the graph of f .

On the same diagram, sketch the graph of f^{-1} .



9) Use the function $f(x) = \ln(x + 2) - 1$ to answer the questions below.

a. Determine the Domain and the Asymptote for this function.

Domain: _____

Asymptote: _____

b. Determine the inverse function, $f^{-1}(x)$, for this function.

$f^{-1}(x) =$ _____

c. Determine $f^{-1}(3) + f^{-1}(-1) =$ _____