

Exam 5 Study Guide

#1 Evaluate each logarithm.

$$\log_4(64)$$

$$\log_2\left(\frac{1}{4}\right)$$

$$\log_4(64) = 3$$

$$\log_2\left(\frac{1}{4}\right) = -2$$

#2 Solve the following exponential equations for x.

$$4^x = 8$$

$$3^{2x} = 81$$

$$(2^2)^x = 2^3$$

$$3^{2x} = 3^4$$

$$2^{2x} = 2^3$$

$$2x = 4$$

$$2x = 3$$

$$x = 2$$

$$x = \frac{3}{2}$$

#3 Rewrite the expression as a sequence of sums and differences of logarithms.

$$\ln\left(\frac{a^2b^3}{c}\right)$$

$$\ln(a^2) + \ln(b^3) - \ln(c)$$

$$2\ln(a) + 3\ln(b) - \ln(c)$$

#4 Rewrite the expression as a single logarithm and simplify if necessary.

$$\log_2(x) - 3\log_2(y) + \frac{1}{2}\log_2(z)$$

$$\log_2(x) - \log_2(y^3) + \log_2(\sqrt{z})$$

$$\log_2\left(\frac{x\sqrt{z}}{y^3}\right)$$

#5 Find the inverse of the given functions.

$$f(x) = 4x - 3$$

$$y = 4x - 3$$

$$x = 4y - 3$$

$$x + 3 = 4y$$

$$\frac{x + 3}{4} = y$$

$$f^{-1}(x) = \frac{x + 3}{4}$$

$$f(x) = \frac{2}{x}$$

$$y = \frac{2}{x}$$

$$x = \frac{2}{y}$$

$$xy = 2$$

$$y = \frac{2}{x}$$

$$f^{-1}(x) = \frac{2}{x}$$

#6 Solve.

$$4^{x-1} = 64$$

$$4^{x-1} = 4^3$$

$$x - 1 = 3$$

$$x = 4$$

$$3^{2x} = \frac{1}{9}$$

$$3^{2x} = 3^{-2}$$

$$2x = -2$$

$$x = -1$$

$$\log_6(2x) = 2$$

$$2x = 6^2$$

$$2x = 36$$

$$x = 18$$

$$\log(x) + \log(x - 3) = 1$$

$$\log(x(x - 3)) = 1$$

$$\log(x^2 - 3x) = 1$$

$$x^2 - 3x = 10^1$$

$$x^2 - 3x - 10 = 0$$

$$(x - 5)(x + 2) = 0$$

$$x = 5, -2 \text{ After checking } x = 5$$

#7 Find the values and composite functions below based on the given functions.

$$f(x) = x^2 - 7$$

$$g(x) = 2x + 5$$

$$h(x) = 3x - 1$$

$$(f \circ g)(1)$$

$$(g \circ f)(1)$$

$$g(1) = 2(1) + 5 = 7$$

$$f(1) = (1)^2 - 7 = -6$$

$$f(g(1)) = f(7)$$

$$g(f(1)) = g(-6)$$

$$f(7) = (7)^2 - 7 = 42$$

$$g(-6) = 2(-6) + 5 = -7$$

$$(h \circ f)(2)$$

$$(f \circ h)(2)$$

$$f(2) = (2)^2 - 7 = -3$$

$$h(2) = 3(2) - 1 = 5$$

$$h(f(2)) = h(-3)$$

$$f(h(2)) = f(5)$$

$$h(-3) = 3(-3) - 1 = -10$$

$$f(5) = (5)^2 - 7 = 18$$

$$(g \circ h)(x)$$

$$(h \circ g)(x)$$

$$g(h(x)) = g(3x - 1)$$

$$h(g(x)) = h(2x + 5)$$

$$g(3x - 1) = 2(3x - 1) + 5$$

$$h(2x + 5) = 3(2x + 5) - 1$$

$$(g \circ h)(x) = 6x + 3$$

$$(h \circ g)(x) = 6x + 14$$

#8 Write the equation of the circle that has diameter endpoints (0, 4) and (6, -4).

Find the center using the midpoint formula: $\left(\frac{0+6}{2}, \frac{4+(-4)}{2}\right) = (3, 0)$