Homework 5.4 – Logarithmic Functions

1. **(1 pt) alfredLibrary/AUCI/chapter5/lesson4/quiz/convert1pet.pg**

Recall that $b^x = y$ is equivalent to $log_b y = x$.

(a) The exponential equation $e^{-4} = 0.0183$ is equivalent to the logarithmic equation

$\ln(\_\_\_\_) = \_\_\_\_$.

(b) The exponential equation $3^{-5} = 0.0067$ is equivalent to the logarithmic equation

$\log_3(\_\_\_\_) = \_\_\_\_$.

(c) The logarithmic equation $\log_{10} 6 = 0.7782$ is equivalent to the exponential equation

___ ___ = ___

(d) The logarithmic equation $\ln 7 = 0.8451$ is equivalent to the exponential equation

___ ___ = ___

2. **(1 pt) alfredLibrary/AUCI/chapter5/lesson4/simplifylog1pet.pg**

Use the properties of logartithms to rewrite the expression as a single logarithmic function:

(a) $5\log x - 5\log(x^2+1) + 3\log(x-1) = \log\left(\_\_\_\_\_\right)$.

(b) $5\log(x+1) - 3\log(x^3+4) - 5\log x = \log\left(\_\_\_\_\_\right)$.

3. **(1 pt) alfredLibrary/AUCI/chapter5/lesson4/solveexponential1pet.pg**

Solve the equation for x.

$$5^{x-1} = 3^{2x+1}$$

$x =$ _____

4. **(1 pt) alfredLibrary/AUCI/chapter5/lesson4/criticalpoint1pet.pg**

Let $f(x) = \dfrac{e^{2x}+8}{e^x}$.

(a) $f'(x) =$ _____.

(b) The only critical point of f is at $x =$ _____.
(**HINT:** The function e^{kx} is never zero.)

(c) The extreme value at the critical point is _____.

5. **(1 pt) alfredLibrary/AUCI/chapter5/lesson4/halflife2pet.pg**

Recall, the continuous exponential growth or decay model is $A(t) = A_0 e^{kt}$, where $A_0 = A(0)$ is the initial amount, and k is the exponential rate of decay.

Half-life is the time it takes for the substance to decay to half of its initial amount, so we set $A(t) = 0.5A_0$ and solve for t.

The half-life of Radium-226 is t = 1590 years. If a sample contains 500 mg, how many mg will remain after 1000 years?

_____