Math 10 – College Algebra – Chapter 4 Test – summer '05 Name_____

Show your work for credit. Write all responses on separate paper.

1. Rewrite the equation $10^{7-x} = 1024$ in equivalent logarithmic form, then solve for x. Finally, use a calculator to approximate x to the nearest thousandth.

2. Rewrite the equation $\log_3 \left(2x^2 + 5x\right) = 1$ in equivalent exponential form, then solve for x.

3. $100 is invested at an annual (yearly) interest rate of 4%, which is compounded weekly.
    a. Find a formula for the function $V(t)$ that gives the exact value of the investment t years later.
    b. Estimate to the nearest penny the value of the investment after one year, and use this value to estimate the effective annual interest rate to the nearest hundredth of a percent.

4. On January 21, 2000, the number of acres in Wisconsin occupied by invasive shrubbery was measured to be about 100. Since then, the number of acres of invasive shrubbery has grown with a relative growth rate of 150% per year.
    a. Write a formula for the function $A(t)$ that models the number of acres of invasive shrubbery t years since January 21, 2000.
    b. Wisconsin has an area of approximately 34.8 million acres. According to your model in (a), when will all of Wisconsin be covered by invasive shrubbery?

5. Solve the equation for x. Approximate to 4 digits, if appropriate.
    a. $e + e^{x+2} = 2.8$
    b. $\log_3 \left(1 - 2x\right) + \log_3 \left(x - 3\right) = 1$

6. Given $f\left(x\right) = \log_3 \left(x + 2\right)$.
    a. Find a formula for the inverse function, $y = f^{-1}\left(x\right)$.
    b. Find the intercept and asymptote of $f\left(x\right)$.
    c. Find the intercept and asymptote of $f^{-1}\left(x\right)$.
    d.

x	−17/9	−5/3	−1	0	1	7	25
$f\left(x\right)$							

    Complete the table above and use the results to sketch a graph showing $y = f\left(x\right)$ and $y = f^{-1}\left(x\right)$ together and illustrating the symmetry through $y = x$.

7. The pH of fluid is measured using the formula pH $= -\log[H^+]$, where $[H^+]$ is the concentration of hydrogen ions in the fluid, measured in moles/liter. If the pH of a fluid is between 7.13 and 8.13, what interval bounds the hydrogen ion concentration?

8. The most important isotope of Plutonium, Pu-239, has a half life of about 24,300 years. How many years would it take 1 gram of Pu-239 to decay to 0.001 grams?