Name:
Exponential \& Logarithmic Functions
Ch. 10 \& 11 Review

1. Does the following represent exponential growth or decay. How can you tell?
a) $y=5(0.7)^{x}$
b) $y=1 / 3(4)^{x}$
2. Write an exponential function for the graph that will pass through $(0,-2)$ and $(3,-54)$
3. Solve each of the equations. Show all work.
a) $9^{x}=\frac{1}{81}$
b) $2^{6 x}=4^{5 x+2}$
c) $\quad 49^{3 \mathrm{p}+1}=7^{2 \mathrm{p}-5}$
d) $2 \mathrm{e}^{\mathrm{x}}-4=1$
e) $\quad-4 \mathrm{e}^{2 \mathrm{x}}+15=7$
4. The population of mice in a particular area is growing exponentially. On January 1, there were 50 mice, and by June 1, there were 200 mice. Write an exponential function of the form $\mathrm{P}(\mathrm{t})=\mathrm{ab}^{\mathrm{t}}$ that could be used to model the mouse population, $P(t)$, of the area as a function of time, $t$, in months since January 1.
5. Write the following in logarithmic form.
a) $7^{3}=343$
b) $\quad 5^{-2}=\frac{1}{25}$
c) $\quad \mathrm{e}^{\mathrm{x}}=6$
6. Write the following in exponential form.
a) $\log _{4} 64=3 \quad$ b) $\log _{8} 2=1 / 3 \quad$ c) $\ln 7.4=\mathrm{x}$
7. Evaluate each expression.
a) $4^{\log _{4} 9}$
b) $\quad \log _{7} 7^{-5}$
c) $\quad \log _{81} 3$
d) $\quad \log _{13} 169$
8. In chemistry the pH of a substance is given by the function $\mathrm{P}(\mathrm{H})=-\log (\mathrm{H})$ where H is the hydrogen ion concentration of the substance. How many times as great is the acidity of orange juice with a pH of 3 as battery acid with a pH of 0 ?
9. Solve each equation.
a) $\quad \log _{4} \mathrm{x}=1 / 2$
b) $\quad \log _{81} 729=\mathrm{x}$
c) $\quad \log _{8}\left(\mathrm{x}^{2}+\mathrm{x}\right)=\log _{8} 12$
d) $\quad \ln (x-10)=0.5$
e) $\quad \ln \mathrm{x}+\ln 4 \mathrm{x}=10$
10. Condense the following into a single statement.
a) $\quad \log _{5}(x+4)+1 / 2 \log _{5} x$
b) $\quad 2 \log _{2} x-\log _{2}(x+3)$
c) $\quad \log _{6} 3 \mathrm{x}^{2}-2 \log _{6}(\mathrm{x} / \mathrm{y})+\log _{6} \mathrm{y}$
11. Solve each equation. Round to 4 decimals ${ }_{x^{2}}$ where appropriate.
a) $\quad 2^{x}=53$
b) $2.3=66.6$
c) $\quad 6^{3 y}=8^{y-1}$
12. Holly deposited $\$ 500$ into a bank account that pays an annual interest rate of $3 \%$ compounded quarterly. Use $A=P(1+r / n)^{\text {nt }}$ to find how long it will take for Diane's money to double.
