Exponential and Logarithmic Functions Worksheet Chapter 3
Spring 2016

Find the indicated values, when necessary, round your answer to two decimal places.

1. $2^{2.5}$

2. $1000 \cdot (1+0.04)^{36}$

3. $8500\left(\frac{3}{4}\right)^{24}$

4. $350e^{(0.05)(12)}$

5. $12.05e^{-1.250}$

6. $5000e^{(0.2354)(100)}$

7. $\frac{250}{1+12.5e^{-0.0150}}$

8. $\ln(1)$

9. $\ln(e)$

10. $-3\ln 2$

11. $\ln\left(\frac{1}{8}\right)$

12. $\ln\left(4e^{-2}\right)$

13. $\ln(4)-2$

8. Use the appropriate formula $A = P(1+\frac{r}{n})^{nt}$ and $A = Pe^{rt}$

Suppose your grandparents deposited $100 into an account the day that you were born. Find the amount in that account on your 20th birthday, if the interest rate was 6% and the interest was compounded,

a. **monthly.**

b. **continuously.**

9. The population of smurfs in a small backwoods village can be approximated by the model, $S = 12e^{0.025t}$, where S is the number of smurfs, and t is the year with $t = 0$ corresponding to 2000. Use the model to approximate the smurfs population in 2000, 2010, and 2015 and the projected population in 2020.

10. Use a graphing utility to find the domain, any asymptotes, intercepts, of the graph of the function, $f(x) = e^x$ and $g(x) = \ln(x)$

11. Use the properties of logarithms to expand the expression as a sum/difference or multiple of logarithms:

a. $\ln\left(\frac{\sqrt{x^2+1}}{x_4}\right)$

b. $\ln\left(x^2\sqrt{1-x^2}\right)$

12. . Use the properties of logarithms to condense the expression as a logarithm of a simgle qunaitty.

a. $\ln(x+2)-3\ln x$

b. $4\ln x+\frac{1}{2}\ln(x+2)$

13. Solve the exponential equation, if necessary round to three decimal places.

a. $e^{-4x}=1$

b. $5e^{2x}-2=10$

c. $200e^{-0.06x}=12000$

d. $\dfrac{750}{1+2.5e^{-0.5t}}=250$

14. The population of a small town in central PA was approximately 10,000 in 2010 and 12,000 in 2015. Assuming the population is *increasing exponentially*, find the population model, $P=ae^{kt}$ where *P* is the population and *t* is the year with *t* = 0 corresponding to the year 2020.

15. A SUV that was purchased new 4 years ago, today has a depreciated value of $18,000. The value of SUV is expected to be $9,000 when it is 6 years old. Find the *exponential (decay*) model that gives the value, $V=ae^{kt}$ where *V* is the value of the SUV, in terms of the number of years, *t* since the vehicle was purchased.

16. A PSU graduate student as part of her research is recording the number of chin-ups (pull-ups) an athlete can do in 60 seconds during their physical therapy rehabilitation. The grad student has fit the data to the model, $N=\dfrac{72}{1+5e^{-0.25t}}$ where *N* is the number of chin-ups, and *t* is time is weeks since starting rehab. Find the following:

a. The number of chin-ups the athlete could in 60 seconds prior to starting rehab.

b. The time it will take until the athlete could do 30 chin-ups in 60seconds.

c. The limiting number of chin-ups the athlete can do in 60 seconds as time in rehab passes infinitely.