

True or False If  $4^3 = 2^a$ , then  $a = 6$ . Justify your answer.

$4^3 = 64$   
 $2^6 = 64$

yes 6 makes the equation true or

$\log_2 4^3 = \log_2 2^a$   
 $3 \log_2 4 = a$   
 $3 \log_2 2^2 = a$   
 $3 \cdot 2 = a$   
 $6 = a$

Applications of Exponential Functions

24. Compound interest is calculated by the following formula:

$A(t) = P \left( 1 + \frac{r}{n} \right)^{nt}$

State the meaning of each variable in the formula above.

$A(t) \rightarrow$  amount at a given time  
 $P =$  principle  
 $r =$  rate (put into decimal form)  
 $n =$  # of times compounded in a year  
 $t =$  time in years

25. Continuously compounded interest is calculated by the following formula:

$A = Pe^{rt}$

State the meaning of each variable in the formula above.

$A =$  amount  
 $P =$  principle  
 $r =$  rate - use decimal form  
 $t =$  time in years

26. Complete the table for a savings account in which interest is compounded continuously.

a)  $4000 = 2000e^{.045t}$

$(A = Pe^{rt})$

$\ln 2 = \ln e^{.045t}$   
 $\frac{\ln 2}{.045} = \frac{.045t}{.045}$   
 $15.4 = t$

b)  $20000 = 10000e^{.093t}$

$\ln 2 = \ln e^{.093t}$   
 $\frac{\ln 2}{.093} = \frac{.093t}{.093}$   
 $7.45 = t$

	Initial Investment	Annual % Rate	Time to Double
a)	2000	4.50%	15.4
b)	10,000	9.30%	7.45
c)	725	9.24%	7.5 yr
d)	5000	6.93%	10 yr

c)  $\frac{1450}{725} = \frac{725}{725} e^{r(7.5)}$   
 $\ln 2 = \ln e^{r(7.5)}$

$\frac{\ln 2}{7.5} = \frac{7.5r}{7.5}$

$.0924 = r$

d)  $10000 = 5000e^{10r}$

$2 = e^{10r}$   
 $\frac{\ln 2}{10} = \frac{10r}{10}$

$.0693 = r$

27. Which of the following scenarios would be the better investment? Use any amount for principal and time. \$1 = P, Time 1 year

a. 7.5% per year, compounded quarterly

$A = 1 \left( 1 + \frac{.075}{4} \right)^4(1)$   
 $= 1.0771$

b. 7.3% per year, compounded continuously

$A = Pe^{rt}$   
 $= 1e^{.073(1)}$   
 $= 1.0757$

\* 7.5% compounded quarterly should be the better investment.