Unit 6 Additional Practice

SECTION 1: Applications

Find the interest and the balance in the account for each given situation.

		Interest	Amount
1.	$1,250 at 7% annually for 3 years	_____	_____
2.	$23,600 at 5% semi-annually for 10 years	_____	_____
3.	$5,000 at 12% monthly for 5 years	_____	_____
4.	$51,275 at 6.5% quarterly for 8.5 years	_____	_____
5.	$7,250 at 18% annually for 15 years	_____	_____
6.	$100,000 at 8% monthly for 25 years	_____	_____

Find the interest and the balance in the account for compounding continuously.

		Interest	Amount
7.	$10,000 at 9% for 5 years	_____	_____
8.	$240,000 at 7% for 25 years	_____	_____
9.	$4,500 at 19% for 10 years	_____	_____
10.	$500 at 5% for 2 years 6 months	_____	_____
11.	$1,750 at 6.25% for 36 months	_____	_____
12.	$17,625 at 4.5% for 7.5 years	_____	_____

Apply the appropriate formula to solve the following compound interest application problems.

13. Matt received a total of $900 for his graduation.
    a) If he invests in a local bank that pays 4.5% APR compounded quarterly, how much will he have in 4 years? (Assume he makes no withdrawals or deposits)

    b) If another bank offers 4.5% APR compounded continuously, how much will he have in 4 years?

14. A bank offers an APR of 8.5% and compounds interest semi-annually for savings accounts. If you were to deposit $2250, what is the value of the account in 5 years?

Calculate an approximate value for the following expressions involving e to 3 decimal places.

15. $e^{2.3}$

16. $e^{4.6}$

17. $\sqrt{e}$

18. $2\sqrt[3]{e^4}$

19. $3\sqrt{e^3}$

20. e^{-2}

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Solve the following exponential application problems using growth/decay formula or the stated exponential model in the problem.

21. The function describing the number of a rare birds that are found in a specific region after ***t months*** is given by:

$$P(t) = 150e^{.05t} \quad where \quad t \geq 0.$$

a) What is the initial population of rare birds? Is this a situation of growth or decay?

b) What is the population of rare birds after 7 months?

c) What is the population of rare birds after 1 year?

d) What is the population of rare birds after 1 decade?

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22. The population of a town is 50,000, and local authorities claim that the population is growing at an exponential rate of 4% per year.

a) Define the function that describes this situation: $P(t) =$ _____

b) Use your function to predict the population in 5 years?

c) Use your function to predict the population in 10 years?

e) Use your function to predict the population in 25 years?

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23. The number of people infected by the flu in a particular region after t hours is given by:

$$P(t) = 5e^{.03t} \quad where \quad t \geq 0.$$

a) Is this a growth or decay problem? What is the rate of growth/decay?

b) What is the initial population of people infected by the flu?

c) What is the population of people infected by the flu after 12 hours?

d) What is the population of people infected by the flu after 1 day?

e) What is the population of people infected by the flu after 1 week?

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24. The population of mosquitoes after t days is given by:

$P(t) = 500e^{-.055t} \quad where \quad t \geq 0.$

a) Is this a growth or decay problem? What is the rate of growth/decay?

b) What is the initial population of mosquitoes?

c) What is the population of mosquitoes after 1 day?

d) What is the population of mosquitoes after 72 hours?

e) What is the population of mosquitoes after 2 weeks?

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25. The number of computers infected by a certain virus that is rapidly spreading is determined by the following model: $V(t) = 25e^{.6t}$ where t is represented in hours.
Determine the number of computers infected after:

a) **1 hour?**

b) **10 hours?**

c) **1 day**?

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26 . If the annual rate of inflation averages 4% over the next ten years, then the cost of goods or services in that decade will be determined according to the following cost model: $C(t) = P(1.04)^t$. Estimate the cost of the following goods/services in
2 years, 5 years and **10 years**.

The following represent the price of items/services at the present time (P).

	2 years	*5 years*	*10 years*
a) Gallon of Milk costs $3.00	_____	_____	
b) A ticket to the Movies costs $7.00	_____	_____	
c) Oil change costs $19.99	_____	_____	

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SECTION 2: Evaluating Exponential and Logarithmic Functions

Use the definition of a logarithm to write the given equation in logarithmic form.

1. $5^3 = 125$ _____
2. $6^{-2} = \frac{1}{36}$ _____
3. $e^3 = 20.085$ _____
4. $e^x = 4$ _____
5. $8^2 = 64$ _____
6. $81^{1/4} = 3$ _____
7. $10^{-3} = 0.001$ _____
8. $e^0 = 1$ _____
9. $u^v = w$ _____
10. $9^{3/2} = 27$ _____

Use the definition of a logarithm to write the given equation in exponential form.

11. $\log_2 8 = x$ _____
12. $\log_5 625 = 4$ _____
13. $\log_x 13 = 5$ _____
14. $\log_2 \frac{1}{8} = -3$ _____
15. $\log_4 64 = 3$ _____
16. $\ln 143 = x$ _____
17. $\log 1000 = 3$ _____
18. $\ln x = 14$ _____
19. $\log \frac{1}{100} = -2$ _____
20. $\ln 18 = x$ _____

Use your calculator to evaluate the following. Round to four decimal places.

21. log 68 _____
22. log 100 _____
23. ln 9 _____
24. log 10 _____
25. ln 216 _____
26. ln 9548 _____
27. log 0.0001 _____
28. log 17 _____
29. ln 125 _____
30. log 6158 _____

Use the change of base formula to evaluate. Round to four decimal places.

31. $\log_3 7 =$ _____
32. $\log_9 0.4 =$ _____
33. $\log_7 4 =$ _____
34. $\log_{20} 125 =$ _____
35. $\log_6 95 =$ _____
36. $\log_{0.5} 4 =$ _____
37. $\log_{15} 1250 =$ _____
38. $\log_4 0.55 =$ _____
39. $\log_{1/3} 0.015 =$ _____
40. $\log_{17} 2 =$ _____

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SECTION 3: Solving Exponential and Logarithmic Equations

Solve the following exponential equations. (Round answers to three decimal places)

1. $10^{x} = 42$

2. $\frac{1}{3}\left(10^{2x}\right) = 12$

3. $3\left(10^{x-1}\right) = 2$

4. $e^{x} = 10$

5. $2^{3x} = 565$

6. $1000e^{-4x} = 75$

7. $25e^{2x+1} = 962$

8. $\frac{1250}{1.04^{x}} = 500$

9. $e^{0.09x} = 3$

10. $\frac{1000}{1+19e^{-x/5}} = 2000$

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Solve the following logarithmic equations. (Round answers to three decimal places)

11. $\ln x = 5$

12. $2\ln x = 7$

13. $2\ln 4x = 0$

14. $\log(x-3) = 2$

15. $6\ln(x+1) = 2$

16. $\log 2 + \log x = 3$

17. $\ln x + \ln(x-2) = 1$

18. $\log x - \log(2x-1) = 0$

19. $\log_2(x+5) - \log_2(x-2) = 3$

20. $\log_4 x - \log_4(x-1) = \frac{1}{2}$