7.4 Exponential Modeling

Corrective Assignment #1

For 1-8, use exponent properties to simplify. Your answer should contain only positive exponents

1. $e^{-2} \cdot e^{4}$
2. $-\dfrac{e^{2x}}{3e}$
3. $\dfrac{7e^{3x}}{e^{x}}$
4. $\left(3e^{-3x}\right)^{2}$
5. $-4e^{2x} \cdot e^{-5}$
6. $\dfrac{e^{5x+2}}{e^{3x+3}}$
7. $(3e)^{-3}$
8. $\left(2e^{3x-4}\right)^{3}$

For 9-12, use a calculator to evaluate the expression. Round the result to three decimal places.

9. $-4e^{2}$
10. $-e^{-2}$
11. $2e^{-4}$
12. $4e^{3}$

Compounding Interest (continuous compounding)	Compounding Interest (periodic compounding)	% increase/decrease per unit of time
$A = Pe^{rt}$	$A = P\left(1 + \dfrac{r}{n}\right)^{nt}$	$f(x) = ab^{x}$

For 13 – 16, write a model for each scenario and use the model to calculate the value for the given number of years. (Not all problems involve compounding interest!)

13. You deposit $7,000 in an account that pays 6% annual interest compounded continuously. How much will you have after 10 years?

14. Your recent purchase of baseball memorabilia is worth $102, but increases by 3.3% every year. How much will it be worth after 20 years?

15. You deposit $500 in an account that pays 8% annual interest compounded monthly. How much will you have after 15 years?

16. You deposit $575 in an account that pays 4% annual interest compounded continuously. How much will you have after 5 years?

17. Functions of the form $P(t) = P_o e^{-rt}$ describe exponential decay, where r is the decay rate, P_o is the initial amount and t is time.

    Suppose a certain radioactive element has an annual decay rate of 13%. Starting with a 200 gram sample of the element, how many grams will be left in 3 years?

ANSWERS: 1. e^{2} 2. $-\frac{e^{2x-1}}{3}$ 3. $7e^{2x}$ 4. $\frac{9}{e^{6x}}$ 5. $-4e^{2x-5}$ 6. e^{2x-1} 7. $\frac{1}{27e^{3}}$ 8. $8e^{9x-12}$ 9. -29.556 10. -0.135 11. 0.037 12. 80.342

13. $7000e^{(0.06)(10)} \approx 12{,}754.83$ 14. $102(1.033)^{20} \approx \$195.26$ 15. $500500\left(1+\frac{0.08}{12}\right)^{12(15)} \approx \$1653.46$ 16. $575e^{(0.04)(5)} \approx \$702.31$ 17. $135.41e$