Section 3.8: Exponential Growth

(1) In this section, we learn how to find the solution to the equation of the form $\frac{dy}{dt} = ky$. Finish the following sentence:

When solving the equation $\frac{dy}{dt} = ky$, we are looking for a function y whose derivative is _____ times _____.

(2) What is the solution to this differential equation? Take the derivative of it and see that it satisfies the rule.

(3) In the differential equation $\frac{dy}{dt} = ky$ or its solution $y = Ce^{kt}$, what does the k represent? What is the significance of k being positive or negative? Explain both using the differential equation and its solution.

(4) Explain how you can use the half-life of a substance to determine its differential equation and solution to the differential equation.

(5) Newton's Law of Heating and Cooling tells us that the rate of change in the temperature of an object is proportional to the difference in the objects temperature and the temperature of the surrounding area. What is the differential equation we get from Newton's Law? What is the solution to this differential equation?

(6) How does compounded continuous interest rate compare to interest compounded n times a year? What is the differential equation and what is its solution for interest being compounded continuously?

Extra Practice in Book: 3.8: 3, 5, 9, 14, 15, 21