Topic 2.3: Exponential Functions
Topic 2.5: Exponential Function Context and Data Modeling
Applying the base e in real world data driven problems

Practice Problem 1

In a research lab, a scientist is cultivating bacteria in a petri dish. As she collects the data for the amount of bacteria in the dish, she recognizes an exponential pattern. Some of the data is shown below. The exponential function that could model the data is $g(t) = 3e^{kt}$, where t is the number of hours since hour 0. Using the table, find the value of k.

t	0	7
$g(t)$	3	8.32

(a) -0.1547

(b) 0.1547

(c) -0.1457

(d) 0.1457

Practice Problem 2

Kevin unfortunately had to have his appendix removed. After a successful surgery, he was in quite a lot of pain. The doctor administered a pain reliever to help his discomfort. Over time, the pain reliever leaves Kevin's body at an exponential rate and can be modeled by the function $h(t) = a \cdot e^{k \cdot t}$, where t is the number of hours after the initial dose and k is a constant. The initial dose was 8 mg and after 4 hours, there is 3 mg left in his body. At what time t will the amount of medicine in Kevin's body be 0.5 mg?

(a) 11.307

(b) 10.307

(c) 9.307

(d) 8.307

Practice Problem 1 Solution:

(d) 0.1457

$8.32 = 3 \cdot e^{7k} \quad k \approx 0.1457$

Practice Problem 2 Solution:

(a) 11.307

$$3 = 8 \cdot e^{4k} \quad k \approx -0.245207313\ldots$$

$$0.5 = 8 \cdot e^{-0.245207313\ldots \cdot t} \quad t \approx 11.307$$