# Section 5.6: Integrals Involving Exponential and Logarithmic Functions

Exponential and logarithmic functions are used to model population growth, cell growth, and financial growth, as well as depreciation, radioactive decay, and resource consumption, to name only a few applications. In this section, we explore integration involving exponential and logarithmic functions.

## Integrals of Exponential Functions

Exponential functions can be integrated using the following formulas.

Media: Watch these [video1](https://youtu.be/D9dqdbCgJQM) and [video 2](https://youtu.be/yy8A5AT532U) examples on integrals involving exponentials.

Examples

1. For each of the following, find the antiderivative.
2. Use substitution to evaluate the indefinite integral .
3. Evaluate the definite integral .
4. Evaluate the definite integral using substitution:
5. Find the price-demand equation for a particular brand of toothpaste at a supermarket chain when the demand is tubes per week at per tube, given that the marginal price – demand function, , for number of tubes per week, is given as . If the supermarket chain sells tubes per week, what price should it set?
6. Suppose the rate of growth of bacteria in a Petri dish is given by , where is given in hours and is given in thousands of bacteria per hour. If a culture starts with bacteria, find a function that gives the number of bacteria in a Petri dish at any time . How many bacteria are in the dish after hours?

## Integrals Involving Logarithmic Functions

The following formulas can be used to evaluate integrals involving logarithmic functions.

Media: Watch these [video1,](https://youtu.be/fudL8Hw_sac) [video 2](https://youtu.be/JMqKtEC2bbY) and [video 3](https://youtu.be/nrt37LoaSxM) examples on integrals involving logarithms.

Examples

1. Find the antiderivative of each of the following.
2. Find the definite integral of .