

Exponential Equations

Victor I. Piercey

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Suppose you invest \$ 1000 in a savings account earning 5 % interest compounded continuously.

How long does it take to double your money? How about triple your money?

Simple Exponential Equation Example 1

Solve

$$2^x = 32.$$

Simple Exponential Equation Example 2

Solve

$$3^{2x} = 27.$$

Simple Exponential Equation Example 3

Solve

$$27^x = 9.$$

Inverse Property of Logs

In order to solve more complicated exponential equations such as $e^x = 2$, we need to use the **inverse properties of logarithms**:

$$\log_a(a^x) = x.$$

This holds for all bases, so in particular

$$\ln(e^x) = x.$$

How to Solve Exponential Equations

There are three steps to solving one of these equations:

- 1 Isolate the exponential expression (if necessary)
- 2 Take the appropriate logarithm of both sides
- 3 Solve the resulting equation (if necessary).

As a first example, solve $e^x = 2$.

Example 1

Solve

$$3e^{x-1} = 5.$$

Example 2

Solve

$$4e^{2x+1} - 11 = 12.$$

Doubling and Tripling Time

How long does it take to double an investment of \$ 1000 in an account earning 5 % interest compounded continuously? How long does it take to triple?

Does this depend on how much money you invest?

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Assignment: Page 431, 1-2, 7 - 18, 27 - 32, 55 - 59, 87, 92. Due Friday.