## Example (Growth of Bacteria)

Alpha research labs are doing experiments on a common household bacteria. The scientists at Alpha labs discover that the population of this bacteria doubles every 20 minutes.

- 1. If the initial population of the bacteria is 100, find an exponential formula for the number of bacteria after *x* hours.
- 2. How long will it take for the bacteria population to reach 12,800? (The Alpha researches have determined that this is a dangerous level of bacteria.)

# **Continuous Compounding**

#### Example (Continuously Compounding Interest)

Assuming continuous compounding, if the inflation rate averaged 5% per year for 5 years, how much would a \$1 item cost at the end of the 5 years?

#### Example

If \$10,000 grows to \$10,400 when it is invested for 10 years at an annual interest rate r with continuous compounding, what is the value of r?

## Equivalent Expressions

## Example

Exponential equations can be written in a logarithmic form.

Exponential formLogarithmic form
$$3^2 = 9$$
 $\log_3 9 = 2$  $\left(\frac{1}{5}\right)^{-2} = 25$  $\log_{1/5} 25 = -2$  $10^5 = 100,000$  $\log_{10} 100,000 = 5$  $e^0 = 1$  $\log_e 1 = 0$