

# Exponential and Logarithmic Functions ☺

Exponential Growth or Decay Function: is a function that grows or shrinks at a constant percentage growth rate!

Equation:

$$f(x) = a(1+r)^x \text{ or } f(x) = ab^x ; b = 1+r$$

$a$  = initial value

$r$  = % rate as a decimal

negative % for decay

positive % for growth

$b = 1$  plus  $r$  as a decimal

$x$  = time (unit determined by problem)

## Example 1

The cost of living allowance for state employees increases salaries by 3% per year. If your salary was 62,000, what would your new salary be in 7 years?

$$a = 62,000$$

$$r = 3\% \rightarrow .03$$

$$b = 1.03$$

$$x = 7 \text{ years}$$

$$f(x) = ab^x$$

$$f(7) = 62000(1.03)^7 \\ = 76,252.18$$

## Example 2

400 Birds are living on an island, insufficient food has caused their population to decrease by 22% per year. How many will be left in 5 years.

$$a = 400$$

$$r = 22\% \rightarrow -.22$$

$$b = 1 - .22 = .78$$

$$x = 5$$

$$f(x) = ab^x$$

$$f(5) = 400(.78)^5$$

$$\approx 115 \text{ birds}$$

$b > 1$  growth,  $0 < b < 1$  = decay