

# Applications of Exponential and Logarithmic Functions

The population of Pakistan, in millions, is approximated by the function

$$f(x) = 126.4 (2)^{.04x}$$

where  $x = 0$  corresponds to 1994.

a) What is the population of Pakistan in 1994?

b) What will the population be in 2019?

The formula  $A = P \left(1 + \frac{r}{n}\right)^{nt}$  calculates the amount of money accrued if compounded  $n$  times per year.

$P =$  principal invested

$t =$  time (in years)

$r =$  annual interest rate  
(as a decimal)

$n =$  # of compounding  
periods per year

Find how long it takes \$600 to double if it is invested at 7% interest compounded monthly.

**Find how long it takes a \$1500 investment to earn \$200 interest if it is invested at 10% compounded semiannually.**

The formula  $A = Pe^{rt}$  calculates the amount of money accrued if compounded continuously.

**Determine the size of an account in which \$3500 earns 6% compounded continuously for 1 year.**

**Find the length of time for \$25,000 to triple when it is compounded at 6% annual interest, compounded continuously.**

Suppose that a flu virus spreads according the following relationship:

$$y = y_0 e^{.0075t}$$

where  $y_0$  represents the number of people affected at time 0, and  $y$  represents the number of people affected at any time  $t$  ( $t$  given in hours). If 20,000 people are affected now, in how many days will 45,000 people be affected?