

Exercises — Applications of logarithms and exponential functions

1. A population of 1000 is expected to grow exponentially over the next ten years at 4% per year. How large will the population be at the end of 10 years?
2. A certain radioactive substance has a half-life of 30 seconds. What percentage of an initial amount of this substance will remain after 10 seconds?
3. If you invest \$5,000 in a money market fund at 15 percent interest compounded annually, how much will you have after 10 years?
4. Approximately how long will it take for money to accumulate to twice its value if it is invested at 8%, compounded annually?
5. Suppose that you invest P dollars at $r\%$ compounded annually. Write an expression for the amount accumulated after n years.
6. A certain radioactive element has a half-life of 400 years. Starting with 50 milligrams there will be $q(t)$ milligrams left after t years, where $q(t) = 50(\frac{1}{2})^{kt}$. How much will be left after 2257 years?
7. Bones from a human body were found to contain only 76% of the carbon-14 in living bones. How long before did the person die? The half-life of carbon-14 is 5668 years.
8. Suppose that you received a gift of \$10,000 this year and placed it in a fund that accrues interest at 10% compounded annually. If you do not withdraw it until the year 2040, how much will you have then?