Compound Interest and Radioactive Decay

Compound Interest

$A = P\left(1 + \frac{r}{n}\right)^{nt}$ Use when given *n* compoundings per year

A = balance (future amount)
P = principal (original amount)
r = interest rate in decimal form
n = number of compoundings per year
t = time in years

$A = Pe^{rt}$ Use when compounded continuously

A = balance (future amount)
P = principal (original amount)
e = the natural base
r = interest rate in decimal form
t = time in years

Values for *n*
Annually: *n* = 1
Biannually/Semiannually: *n* = 2
Quarterly: *n* = 4
Monthly: *n* = 12
Weekly: *n* = 52
Daily: *n* = 365

1. A total of $11,000 is invested at an annual interest rate of 7.5%, compounded monthly. Find the balance in the account after 5 years.

2. The balance after 3 years in an account is $2,500. How much was originally invested if the annual interest rate is 7.25%, compounded continuously?

3. Katie deposits $5,000 into an account that pays 6.25% interest, compounded continuously. How long will it take for the money to triple?

Radioactive Decay

$$\frac{1}{2} = e^{kt}$$

Use to find the value of *k* when given the half-life in *t* years.

$$y = ae^{kt}$$

y = amount after *t* years
a = initial amount
e = the natural base
k = constant
t = time in years

4. The half-life of Radium 226 is 1,620 years. Determine the amount of Radium 226 after 1,000 years if the initial amount was 25 grams.

5. The half-life of Carbon 14 is 5,730 years. What percent of the present amount of Carbon 14 will remain after 1000 years?