Exponential Functions Unit Day 4

Objectives:

- Simple Interest
- Compound Interest
- Use Functions involving *e*

Compound Interest:

Compound Interest isinterest paid on the initial investment, called principal, and on previously earned interest.

Interest paid only on principal is called simple interest.

Formulas:

Simple Interest: $I = Prt$ Compound Interest: $A = P(1 + r/n)^{nt}$

I = amt of interest paid

A = total acct balance

P = initial amt called principle

r = rate

n = # times interest is compounded

t = time

What would "n" be if the interest was compounded:

annually? $n = 1$

semi-annually? $n = 2$

monthly? $n = 12$

bi-monthly? $n = 6$

quarterly? $n = 4$

daily? $n = 365$

weekly? $n = 52$

You deposit $4000 in an account that pays 2.92% interest. Find the balance after 1 year if the interest is compounded with the given frequency. State the amount of interest earned.

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

a. Quarterly
Balance: $A = 4000\left(1 + \frac{.0292}{4}\right)^{4 \cdot 1}$

$A = \$4118.09$

Interest earned: $118.09

b. Monthly
Balance: $A = 4000\left(1 + \frac{.0292}{12}\right)^{12 \cdot 1}$

$A = \$4118.38$

Interest earned: $118.38

c. Daily
Balance: $A = 4000\left(1 + \frac{.0292}{365}\right)^{365 \cdot 1}$

$A = \$4118.52$

Interest earned: $118.52

d. Semi-annually
Balance:

Interest earned:

e. Simple interest
Balance:

Interest earned:

i (imaginary number)-

π (pi) -

e (the natural base)- Euler's #

$e = 2.71828$

Simplify:

$e^2 \cdot e^5 =$ e^7

$\frac{12e^4}{3e^3} =$ $4e$

$(5e^{-3x})^2 =$ $25e^{-6x}$

$= \frac{25}{e^{6x}}$

$\sqrt{4e^{12}}$

$2e^{6}$

$\sqrt[3]{27e^{18x}}$

$3e^{6x}$

Continuously Compounded Interest

Formula: $A = Pe^{rt}$

A = acct balance

P= principle (initial amt)

r= rate

t= time

You deposit $4000 in an account that pays 6% annual interest compounded continuously. What is the balance after 1 year? How much interest has been earned?

$A = Pe^{rt}$

$A = 4000e^{(.06)1}$

$A = \$4247.35$

Interest earned: $247.35

$1500 is deposited in an account that pays 3.45% interest annually. What is the balance after 2.5 years if..

a. interest is compounded quarterly?

$A = P\left(1+\frac{r}{n}\right)^{nt}$

$A = 1500\left(1+\frac{.0345}{4}\right)^{4(2.5)}$

$A = \$1634.51$

b. interest is compounded daily?

$1635.11

c. interest is compounded continuously?

$A = Pe^{rt}$

$A = 1500e^{(.0345)(2.5)}$

$A = \$1635.12$