4.3 Compound Interest

Compound Interest:

when a bank pays interest on both the principal (original amount of money) and the interest an account already has

Compound Interest

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

P= Principal

R= annual interest rate

t= time in years

n= number of times compounded per year

If you have a bank account whose principal is $1000, and your bank compounds the interest twice a year at an interest rate of 5%, how much money do you have in your account at the year's end?

$P = 1000$

$R = 5\% \rightarrow .05$

$N = 2$

$T = 1$

$$A = 1000\left(1 + \frac{.05}{2}\right)^{(2)(1)}$$

$$1000\left(1 + \frac{.05}{2}\right)^{2}$$

$$= \$1050.62$$

If you start a bank account with $10,000 and your bank compounds the interest quarterly at an interest rate of 8%, how much money do you have at the year's end?

$P = 10,000$

$R = 8\% \rightarrow .08$

$N = 4$

$T = 1$

$$A = 10000\left(1 + \frac{.08}{4}\right)^{4(1)}$$

1st: $\frac{.08}{4}$ ^

2nd: + 1

3rd: ^ 4

4th: * 10,000

$$A = \$10,824.32$$

If you start a bank account with $500 and your bank compounds the interest quarterly at an interest rate of 3%, how much money do you have aer 5 years?

$P = 500$

$R = .03$

$N = 4$

$T = 5$

$$500\left(1+\frac{.03}{4}\right)^{(4)(5)}$$

$$500\left(1+\frac{.03}{4}\right)^{20}$$

$$=580.59$$

The first credit card that you got charges 12.49% interest to its customers and compounds that interest monthly. Within one day of geng your first credit card, you max out the credit limit by spending $1,200. If you do not buy anything else on the card and you do not make any payments, how much money would you owe the company aer 6 months?

P=1200

R = .1249

.1249

N=12

T=.5

$$A = 1200\left(1 + \frac{.1249}{12}\right)^{(12)(5)}$$

$$1200\left(1 + \frac{.1249}{12}\right)^{60}$$

$$= \$1276.91$$