Sections 9.1 and 9.2
Compound Interest

Section 9.1

A loan of $1500 is taken for 6 months at 5.25%. How much is in the account if this is taken twice?

\[
I = 1500 \cdot 0.0525 \cdot \frac{6}{12} = \$39.38
\]

\[
I = 1539.38 \cdot 0.0525 \cdot \frac{6}{12} = \$40.41
\]

Total: \$1579.79
In the preceding problem, the loan was rolled over onto itself twice. This is a **Compounding Period**.

This is the formula for compounding interest.

\[ FV = PV \left( 1 + \frac{r}{n} \right)^{nt} \]

- **FV** - future value, amount you will have in the future
- **PV** - present value, the amount you currently have
- **r** - rate, the interest rate for the given situation
- **n** - compounding periods, how many times will the account compounds in a year
- **t** - time, how long the account is used, always in years

Back to the first problem, $1500 at 5.25% but we actually left the money for 1 year (2 6-month periods) which means it compounded semiannually. Now with the compounding formula recalculate.

\[ FV = 1500 \left( 1 + \frac{.0525}{2} \right)^{2(1)} \]

\[ 1500 \left( 1 + \frac{.0525}{2} \right)^{(2 \cdot 1)} \]

\[ = 1579.78 \]
How much will I have from an account if I leave $25000 for 5 years at 6.75% and it compounds monthly?

\[
FV = 25000 \left(1 + \frac{0.0675}{12}\right)^{12 \times 5}
\]

\[
FV = $35002.87
\]

What about if it compounds weekly?

\[
FV = 25000 \left(1 + \frac{0.0675}{52}\right)^{52 \times 5}
\]

\[
FV = $35028.32
\]

We put $1300 into an account at 3.85% for 12 years compounding quarterly. What is the interest made from this account?

\[
FV = 1300 \left(1 + \frac{0.0385}{4}\right)^{4 \times 12}
\]

\[
FV = $2058.87
\]

\[
I = 2058.87 - 1300 = $758.87
\]
At birth, your grandfather gives your child $2500 for college and tells you to invest it and pull it out when the child is ready for college. After 20 years of being in the stock market, rates are showing to be 10.35% and it compounds quarterly. How much money does your child have for college?

\[
FV = 2500 \left(1 + \frac{.1035}{4}\right)^{4 \times 20}
\]

\[
FV = \$19,297.26
\]

Section 9.2

With compound interest, all daily compounding is figured with 365 days.

We take the $745 from our garage sale and hold it for 55 days instead of spending it, to think about what we might use it on. We put it in an account at 4.75% that compounds daily. How much interest did we make?

\[
FV = 745 \left(1 + \frac{.0475}{365}\right)^{365 \times \frac{55}{365}}
\]

\[
FV = 750.35
\]

\[
I = \$5.35
\]
In a savings account, we start the account with $1000 from our graduation on May 18. Then on June 29, we deposit another $450. On the 17th of August, we deposit $895. How much money is in the account on Nov 23? How much interest did we make so far with this account?

In a savings account, we start the account with $750 from our birthday on Feb 18. Then on March 29, we deposit another $750. On April 15, we withdraw $895. How much money is in the account on July 23? How much interest did we make so far with this account?
I put $2900 into a CD for 3 years at 6.35% that compounds monthly. How much money do I make in interest?

\[
FV = 2900 \left(1 + \frac{0.0635}{12}\right)^{12 \times 3}
\]

\[
FV = 3506.82
\]

$606.82

**Consumer Price Index (CPI)** - calculated by the govt each year to track inflation

The CPI is currently 3.8%. If you made $25,400 at your job last year, what would you have to make this year to have the same purchasing power?

\[
25400 \times 1.038 = \$26365.20
\]