FINANCE FORMULAS
Business Math

Variables
- **I**: interest
- **r**: annual interest rate (given as a %)
- **m**: number of compounding periods per year
- **i**: interest rate per period \((i = r/m)\)
- **t**: number of years
- **n**: total number of periods \((n = tm)\)
- **P**: principal or present value (amount borrowed or deposited)
- **A**: future value of a lump sum
- **S**: future value of an annuity
- **n**: total periodic payments (in an annuity)
- **R**: the periodic payment in an annuity

Simple Interest
Interest \(I = Prt\)

Compound Interest
Periodic: \(A = P(1 + i)^n\)
Continuous: \(A = Pe^{rt}\)

Effective Rate: \(r_E = \left(1 + \frac{r}{m}\right)^m - 1\)

Annuities
A sequence of equal payments made at equal periods of time is called an annuity.

**Ordinary Annuity**: the payments are made at the end of each period

Future Value: \(S = R \left[\frac{(1+i)^n-1}{i}\right]\)

Present Value: \(P = R \left[\frac{1-(1+i)^{-n}}{i}\right]\)

**Annuity Due**: the payments are made at the beginning of each period.

Future Value: \(S = R \left[\frac{(1+i)^{n+1}-1}{i}\right] - R\)

Present Value: \(P = R + R \left[\frac{1-(1+i)^{-(n-1)}}{i}\right]\)

**Amortization Payments**: payments that are divided into equal amounts for the duration of the loan

\[ R = \frac{Pi}{1 - (1 + i)^{-n}} \]