Review of Financial Mathematics

Notation

\[ \begin{align*}
A &= \text{Future Value} & n &= \text{Number of times compounded annually} \\
P &= \text{Present Value} & N &= \text{Number of payments} \\
r &= \text{Interest Rate (annual)} & m &= \text{Amount of payment} \\
t &= \text{Time (in years)} &
\end{align*} \]

Interest Formulae

**Simple Interest**

**Interest:** \( I = Prt \)

**Future Value:** \( A = P + I = P(1 + rt) \)

**Compound Interest**

**Future Value:** \( A = P \left( 1 + \frac{r}{n} \right)^{nt} \)

**Present Value:** \( P = A \left( 1 + \frac{r}{n} \right)^{-nt} \)

**Continuous Compounding:** \( A = Pe^{rt} \)

**Installment Buying** (Add-on Interest)

**Interest:** \( I = Prt \)

**Amount to repay:** \( A = P(1 + rt) \)

**Number of payments:** \( N = 12t \)

**Amount of payment:** \( m = \frac{A}{N} \)

**Annual Percentage Rate:** \( APR = \frac{2Nr}{N + 1} \)

**Annuities and Amortization**

**Future Value:** \( A = m \left[ \frac{(1 + \frac{r}{n})^{nt} - 1}{\frac{r}{n}} \right] \)

**Present Value:** \( P = m \left[ \frac{1 - (1 + \frac{r}{n})^{-nt}}{\frac{r}{n}} \right] \)

**Sinking Fund:** \( m = \frac{A(\frac{r}{n})}{(1 + \frac{r}{n})^{nt} - 1} \)

**Amortization:** \( m = \frac{P(\frac{r}{n})}{1 - (1 + \frac{r}{n})^{-nt}} \)