**APR** = \( n \times \left[ (1 + \text{EAR})^{\frac{1}{n}} - 1 \right] \)

- **Compounding.** \( V(0) \) today is worth \( V(n) = V(0) \times \exp(nr) \) in \( n \) periods. Hence \( r = \frac{\ln(V(n)) - \ln(V(0))}{n} \)

- **Present Value:** \( P = \frac{C(1)}{1+r} + \frac{C(2)}{(1+r)^2} + \cdots + \frac{C(T)}{(1+r)^T} \)

- Suppose that \( X_1, X_2, \ldots, X_n \) are random variables and \( k_1, k_2, \ldots, k_n \) are constants. Then
  \[
  E(\Sigma k_j X_j) = \Sigma k_j E(X_j) \quad \text{and} \quad \text{Var}(\Sigma k_j X_j) = \Sigma_{j=1}^n k_j \text{Cov}(X_i, X_j)
  \]

- **Minimum Variance Portfolio weights (2 assets):** 
  \[
  w_D = \frac{\sigma_E^2 - \text{Cov}(R_D, R_E)}{\sigma_E^2 + \sigma_D^2 - 2\text{Cov}(R_D, R_E)} \quad \text{and} \quad w_E = 1 - w_D
  \]

- **Maximum Sharpe Ratio Portfolio weights (2 assets):** 
  \[
  w_D = \frac{E(R_D)\sigma_E^2 - E(R_E)\text{Cov}(R_D, R_E)}{E(R_D)\sigma_E^2 + E(R_E)\sigma_D^2 - [E(R_D) + E(R_E)]\text{Cov}(R_D, R_E)}
  \]
  and \( w_E = 1 - w_D \) where \( R_D \) and \( R_E \) are excess returns over the risk-free rate

- **Optimal complete portfolio.** If an investor has a utility function \( E(r) - \frac{A}{2} \sigma^2 \) then the weight in the tangent portfolio will be 
  \[
  \frac{E(r_p) - r_f}{A\sigma_p^2}
  \]
  where \( r_p \) is the return on the tangent portfolio and \( \sigma_p^2 \) is its variance.

- **Zero beta CAPM.** In the zero-beta CAPM (no risk-free asset), with two possible assets, if the market portfolio has a weight of \( w \) in asset 1, then the zero-beta portfolio will have a weight of \( v \) in asset 1 where:
  \[
  v = \frac{(w-1)\text{Var}(r_1) - w\text{Cov}(r_1, r_2)}{w\text{Var}(r_1) - (1-w)\text{Var}(r_2) + (1-2w)\text{Cov}(r_1, r_2)}
  \]

- **Factor Model**
  \[
  r_i = E(r_i) + \beta_i F_1 + \beta_{i2} F_2 + \cdots + \beta_{ik} F_k + \epsilon_i
  \]
  \[
  E(r_i) = r_f^i + \lambda_i^1 \beta_i + \lambda_i^2 \beta_{i2} + \cdots + \lambda_i^k \beta_{ik}
  \]