CHE374 Cheatsheet

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1 Week 1

> Terminology: **Interest Rate**
> 1. P: Principle amount
> 2. F: Future amount
> 3. F_N : Future amount in (time unit) N
> 4. N: Number of periods (e.g. years)
> 5. i: Interest rate
> 6. I: Total interest amount

7. r Nominal interest rate (usually for 1 year)
8. m: Number of times compounded (subperiods) per year
9. i_s: Subperiod interest rate
10. i_e: Effective interest rate, the equivalent rate if compounded only once per year.

Definition: **Interest Rate**

$$i = \frac{I}{P} \tag{1}$$

Definition: **Subperiod Interest Rate**

$$i_s = \frac{r}{m} \tag{2}$$

Definition: **Effective Interest Rate**

$$i_e = (1 + i_s)^m - 1 \tag{3}$$

Definition: **Simple Interest**

$$F_N = P(1 + Ni) \tag{4}$$

Definition: **Compound Interest**

$$F_N = P(1 + i)^N \tag{5}$$

Definition: **Compound Interest with Subperiods**

$$F_N = P(1 + i_s)^m = P(1 + i_e) \tag{6}$$

Definition: **Continuous Compound Interest:** The finite amount of i_e as the compounding period becomes infinitesimally small.

$$i_e = \lim_{m \to \infty} \left(1 + \frac{r}{m}\right)^m - 1 = e^r - 1 \tag{7}$$

- **Note:** i_e increases as the compounding period decreases.

2 Week 2

2.1 Cash-Flow Diagrams

Definition: **Cash-flow Diagrams:** A simple graph that summarizes the **timing** and **magnitude** of cash-flows.

- **X-axis:** Discrete time periods
- **Y-axis (implicit):** Size and direction of cash-flow.
- **Individual cash-flows (arrows):**
  - **Outflow:** Cash out of the system (downward arrow)
  - **Inflow:** Cash into the system (upward arrow)

2.2 Equivalence Factors

3 Week 3

3.1 Mortgage Terms

Terminology: **Mortgage**

1. **Principle:** The amount of money you borrow to pay for a real property.
2. **Down Payment:** The fraction of the cost of the real property that you pay upfront yourself. (Usually 20%)
3. **Loan-to-Value Ratio (LTV):** Ratio of mortgage loan to value of the property.
4. **Mortgage Rate:** The interest rate charged on the mortgage.
5. **Amortization Period:** Time horizon for mortgage payment.
6. **Term:** Duration of time where the mortgage rate is fixed. When term ends, re-evaluate how much you still owe, then use new interest rate to calculate monthly payment based on time left in amortization period.

Definition: **Net amount owed at end of term**

$$Net = P\,(1+i)^{t\times N} - A\left(\frac{(1+i)^{t\times N}-1}{i}\right) \tag{8}$$

- P (Mortgage principle)
- A (Regular mortgage payment (usually per month))
- i (Mortgage rate per annum based)
- N (Number of payment periods per year)
- t (Number of years in term)

Definition: **Net monthly payment**

$$A = P(\frac{i}{1-(1+i)^{-t\times N}}) \tag{9}$$

3.2 Bond Terms

Terminology: **Bond**

1. **Bond:** A type of loan where the creditor pays a stated amount at specified intervals for a defined period (Coupon Payments), plus a final amount at a specified date (Face Value).
2. **Coupon Rate:** The rate used to calculate coupon payments.