Finance Formula Sheet

Inflation & CPI

Inflation/Deflation Rate from year X to year Y = $\left|\frac{\text{CPI Year Y}}{\text{CPI Year X}} - 1\right|$

Revenue, Cost, & Profit

$R(q)$: Revenue producing/selling q items

$C(q)$: Revenue producing/selling q items

$P(q)$: Profit producing/selling q items

$P(q) = R(q) - C(q)$

Fixed Costs $= C(0)$

Average Revenue at Production Level $q = \dfrac{R(q)}{q}$

Average Cost at Production Level $q = \dfrac{C(q)}{q}$

Average Profit at Production Level $q = \dfrac{P(q)}{q}$

Marginal Revenue from Production Level q_1 to Level $q_2 = \dfrac{R(q_2) - R(q_1)}{q_2 - q_1}$

Marginal Cost from Production Level q_1 to Level $q_2 = \dfrac{C(q_2) - C(q_1)}{q_2 - q_1}$

Marginal Profit from Production Level q_1 to Level $q_2 = \dfrac{P(q_2) - P(q_1)}{q_2 - q_1}$

Break-Even Point: Production level q at which where $R(q) = C(q)$, equivalently, where $P(q) = 0$.

Simple Discount Notes

M: Maturity

D: Discount

P: Proceeds

r: Annual Interest Rate (Discount Rate)

Discount: $D = Mrt$
Proceeds: $P = M - D$
Nominal Interest Rate: $r_{\text{nom}} = r$
Effective Interest Rate: $r_{\text{eff}} = \dfrac{r}{1 - rt}$

Discrete Compounded Interest

F: Future Value

P: Present/Principal Value

r: Annual Interest Rate

k: Number Compounds Per Year

i_p: Interest Per Period

n: Number Compounds/Periods

t: Years

t_D: Doubling Time

r_{nom}: Nominal Annual Interest Rate

r_{eff}: Effective Annual Interest Rate

Interest Per Period: $i_p = r/k$
Number Compounds/Periods: $n = kt$

Future Value: $F = P(1+i_p)^n = \boxed{P\left(1+\frac{r}{k}\right)^{kt}}$

Present Value: $P = \frac{F}{(1+i_p)^n} = F(1+i_p)^{-n} = \boxed{\frac{F}{\left(1+\frac{r}{k}\right)^{kt}}} = F\left(1+\frac{r}{k}\right)^{-kt}$

Time to Grow from P to F:

$$t = \frac{\ln(F/P)}{k\ln(1+r/k)}$$

$$n = \frac{\ln(F/P)}{\ln(1+r/k)}$$

Doubling Time:

$$t_D = \frac{\ln(2)}{k\ln(1+r/k)}$$

$$n = \frac{\ln(2)}{\ln(1+r/k)}$$

Nominal Interest: $r_{\text{nom}} = r$
Effective Interest: $r_{\text{eff}} = \left(1+\frac{r}{k}\right)^k - 1$

Continuous Compounded Interest

F: Future Value

P: Present/Principal Value

r: Annual Interest Rate

t: Years

t_D: Doubling Time

r_{nom}: Nominal Annual Interest Rate

r_{eff}: Effective Annual Interest Rate

Future Value: $F = Pe^{rt}$

Present Value: $P = \boxed{\dfrac{F}{e^{rt}}} = Fe^{-rt}$

Time to Grow from P to F: $t = \dfrac{\ln(F/P)}{r}$

Doubling Time: $t_D = \dfrac{\ln(2)}{r}$

Nominal Interest: $r_{\text{nom}} = r$

Effective Interest: $r_{\text{eff}} = e^r - 1$

Annuities

R: Payments per Period

P: Present/Principal Value

F: Future Value

r: Annual Interest Rate

t: Number of Years

k: Compounds per Year

i_p: Interest per Period

i: Interest per Payment Period

CY: Number of Compounds per Year

PY: Number of Payments per Year

Interest per Compound Period: $i_p = r/k$

Number Payments: $\text{PM} = t \cdot \text{PY}$

Future Value: $F = R\,\dfrac{(1+i_p)^{\text{PM}} - 1}{i_p}$

Payments: $R = F\left(\dfrac{(1+i_p)^{\text{PM}} - 1}{i_p}\right)^{-1}$

Present Value: $P = R\,\dfrac{1-(1+i_p)^{-\text{PM}}}{i_p}$