Financial Institutions with John Elder

Discounting Cash Flows:

Lump-Sum Payments with constant "interest rate" or "discount rate" *i*:

FV of a payment C in n years $\quad FV = C(1+i)^n$

PV of a payment C to be received in n years: $\quad PV = C / (1+i)^n$

Annuity with constant *i*: PV of an annuity C for n years, beginning in 1 year:

The PV of such an annuity can be found using one of two methods. Each method gives the same answer.

$$PV = \frac{C}{(1+i)^1} + \frac{C}{(1+i)^2} + \cdots + \frac{C}{(1+i)^n} \qquad PV = C\,\frac{1-\left(\frac{1}{1+i}\right)^n}{i}$$

Perpetuity with constant *i*: PV of a perpetuity C forever: $\quad PV = C / i$

Duration: $D = \dfrac{\sum_{t=1}^{n} \dfrac{CF_t * t}{(1+i)^t}}{\sum_{t=1}^{n} \dfrac{CF_t}{(1+i)^t}}$ (textbook) $\qquad D = \sum_{t=1}^{n}\left(t * \dfrac{PV(CF_t)}{PB}\right)$ (simpler version)

Discount yield (e.g., T-bills): $y_d = \dfrac{Par - \text{Price}}{Par} \times \dfrac{360}{\text{Days}} \times 100\%$

Duration: $\%\Delta P/P = -D \times \Delta i/(1+i) \times 100$