Finance with John Elder

Discounting Cash Flows: For stock valuation, use D = Dividend or D= Free Cash Flow.

EAR = $(1+\text{APR/m})^m - 1$

Lump-Sum Payments with constant *r*: FV of a payment D in T years = $D(1+k)^T$
PV of a payment D to be received in T years: $PV = D/(1+k)^T$

Annuity with constant *r*: PV of an annuity D for T years, beginning in 1 year, growing at rate g: $PV = D\dfrac{1-\left(\frac{1+g}{1+k}\right)^T}{k-g}$

Perpetuity with constant *r*: PV of a perpetuity D forever, growing at rate g: $PV_0 = D_1 / (k-g) = D_0(1+g)/(k-g)$

Differential Growth $PV_0 = \dfrac{D_1}{1+k} + \dfrac{D_2}{(1+k)^2} + \cdots + \dfrac{D_T + P_T}{(1+k)^T}$ where $P_T = \dfrac{D_{T+1}}{k-g}$

Sustainable growth rate: g = ROE*b

Statistics: For random variable with given distribution:
Let $p(s)$ be the probability of state s and $r(s)$ be the return if state s happens.
Mean: $E(r) = \sum p(s)r(s)$ $\quad$ $\text{Var}(r) = \sigma^2 = \sum p(s)[r(s)-E(r)]^2$ $\quad$ $\text{SD}(r) = \sigma = \text{sqrt}(\sigma^2)$
Covariance: $\text{Cov}(r_i,r_j) = \sum p(s)\,[r_i(s)-E(r_i)][r_j(s)-E(r_j)]$ $\quad$ Correlation: $\rho = \text{Cov}(r_i,r_j)/\sigma_i\sigma_j$
Note 1: for historical sample, use $p(s)=1/S$ or, for variance, $p(s)=1/(S-1)$

Mean of portfolio: $E(r_p) = wE(r_i) + (1-w)E(r_j)$
Variance of portfolio: $\text{Var}(r_p) = \sigma_p^2 = w^2\sigma_i^2 + (1-w)^2\sigma_j^2 + 2w(1-w)\rho\sigma_i\,\sigma_j$

Mean-Variance Analysis and Asset Pricing:

CAPM: $E(r_i) - r_f = \beta_i \times [E(r_M) - r_f]$ $\quad$ where $\beta_i = \text{cov}(r_i,r_M)/\text{var}(r_M)$
Capital Allocation Line – "Frontier" with one risky asset ($\sigma>0$) and T-bills ($\sigma=0$) is a line!
Efficient Frontier – "Frontier" with two or more risky assets ($\sigma>0$) is hyperbola (if $\rho<1$)!

Accounting Ratios and Formulas:

Free Cash Flow
FCF to Firm = OCF – Capital Expenditures – Increase in NWC $\quad$ where OCF = EBIT(1-t) + Dep
FCF to Equity = FCF to Firm – Interest(1-t) + Increase in Net Debt

Liquidity
Current ratio = CA/CL,
Quick ratio = (CA – Inv) / CL
Cash ratio = Cash / CL

Management Skill
Total Asset Turnover = Sales / TA
Fixed Asset Turnover = Sales / FA
Inventory Turnover = COGS / Inv
Working Capital Turnover = Sales / (AR + Inv)
Capital Spending Rate = Capital Spending / Sales

Profitability
Profit Margin = EBIT/Sales,
Return on Assets = EBIT/Assets (or NI/Assets)
Operating margin = (Operating Profit – Dep)/Sales
Return on Equity = (NI-preferred div) / ComEquity

Leverage (Financial Risk)
Debt to Equity = D / E
Debt (Leverage) Ratio = D / Assets
Debt / Capital where Capital = LTD+ Eq
Times Interest Earned = EBIT / Int Exp

Market Ratios
PE = Price/Earnings,
PB = Price/Book value,
PS = Price/Sales

Dupont Formula
ROE = (NI/Sales)*(Sales/TA)*(TA/Equity) $\quad$ (abbreviated form)
ROE = (NI/Pretax inc)*(Pretax Inc/EBIT)*(EBIT/Sales)*(Sales/TA)*(TA/Equity)

Risk Adjusted Performance:

Sharpe's: $\dfrac{\bar{r}_p - \bar{r}_f}{\sigma_p}$ $\quad$ Treynor: $\dfrac{\bar{r}_p - \bar{r}_f}{\beta_p}$ $\quad$ Jenson's: $\alpha_p = \bar{r}_p - \left[\bar{r}_f + \beta_p\left(\bar{r}_m - \bar{r}_f\right)\right]$

$M^2 = r_p^* - r_m$, where $E(r_p^*) = w\,E(r_p) + (1-w)E(r_f)$ with $w=\sigma_M/\sigma_p$.
$T^2 = r_p^* - r_m$, where $E(r_p^*) = w\,E(r_p) + (1-w)E(r_f)$ with $w=\beta_M/\beta_p$.