

## Formulae Sheet

1. Future value of a lump sum  $FV_t = PV (1 + i)^t$
2. Present value of a lump sum  $PV = FV_t / (1 + i)^t$
3. Future value of an annuity  $FV = PMT * \frac{(1 + i)^t - 1}{i}$
4. Present value of an annuity  $PV = PMT * \left[ \frac{1}{i} - \frac{1}{i(1 + i)^t} \right]$
5. Present value of a perpetuity  $PV = PMT / i$
6. Effective annual rate  $EAR = [1 + APR/m]^m - 1$
7. CAPM:  $\hat{r}_i = \hat{r}_{RF} + \beta_i (\hat{r}_m - \hat{r}_{RF})$
8. Zero Growth Model:  $P_0 = D / r_s$
9. Constant Growth Model:  $P_0 = \frac{D_1}{r_s - g}$
10. Variable Growth Model:  $P_0 = \sum [D_t / (1 + r_s)^t]$
11. growth rate =  $g = RR * ROE$  [note: **g = growth rate, RR = retention rate**]
12. Cost of Preferred Stock =  $r_p = \frac{D_p}{V_p (1 - f_p)}$
13. Cost of Retained Earnings ( $r_s$ )
  - (A) CAPM approach

$$r_s = r_{RF} + \beta (r_M - r_{RF})$$
 [note:  **$r_M$  = return on the market,  $r_{RF}$  = risk-free rate**]
  - (B) Discounted Cash Flow Method (DCF)

$$r_s = (D_1/P_0) + g$$
  - (C) Bond Yield Plus Risk Premium Approach

$$r_s = r_d + \text{risk premium}$$
 [note:  $r_d$  = cost of debt]
14. Cost of Newly Issued Common Stock =  $r_e = \frac{D_1}{P_0(1 - f_e)} + g$
15.  $WACC_1 = w_d r_d (1 - t) + w_p r_p + w_s r_s$  [note:  **$w_d$  = % debt,  $w_p$  = % preferred stock,  $w_s$  = % common stock**]
16.  $WACC_2 = w_d r_d (1 - t) + w_p r_p + w_s r_e$
17. Breakpoint =  $RE / (\% \text{ cs in capital structure})$  [note: **RE = retained earnings**]
18. Net Present Value (NPV) =  $PV(CFs) - \text{Initial Investment}$
19. Profitability Index (PI) =  $\frac{PV \text{ of cash inflows}}{PV \text{ of cash outflows}}$