Debt and Taxes

1. (Example 1 in the Note)
   For the most recent fiscal year, Texasfield had $5.35 million in interest expense. If the firm's marginal tax rate is 30%, what is the value of the interest tax shield for Texasfield in the most recent fiscal year?

   Solution)
   The interest tax shield for the most recent fiscal year is $\$5.35\ million \times 30\% = \$1.61\ million$.

2. (Example 2 in the Note)
   Suppose ALCO plans to pay $60 million in interest each year for the next eight years, and then repay the principal of $1 billion in year 8. These payments are risk free, and ALCO's marginal tax rate will remain 39% throughout this period. If the risk-free interest rate is 6%, by how much does the interest tax shield increase the value of ALCO?

   Solution)
   The annual interest tax shield is $\$60\ million \times 39\% = \$23.4\ million$ for eight years.

$$PV(Interest\ Tax\ Shield) = \$23.4\ million \times \frac{1}{6\%}\left(1 - \frac{1}{1.06^8}\right) = \$145.31\ million$$

3. (Example 3 in the Note)
   Harris Solutions expects to have free cash flow in the coming year of $1.75 million, and its free cash flow is expected to grow at a rate of 3.5% per year thereafter. Harris Solutions has an equity cost of capital of 12% and a debt cost of capital of 7%, and it pays a corporate tax rate of 40%. If Harris Solutions maintains a debt-equity ratio of 2.5, what is the value of its interest tax shield?

   Solution)
   We can estimate the value of Harris Solution's interest tax shield by comparing its value with and without leverage. We compute its unlevered value by discounting its free cash flow at its pretax WACC:

$$Pretax\ WACC = \frac{E}{E+D}r_E + \frac{D}{E+D}r_D = \left(\frac{1}{1+2.5}\right)12\% + \left(\frac{2.5}{1+2.5}\right)7\% = 8.43\%$$

   Because Harris Solution's free cash flow is expected to grow at a constant rate, we can value it as a constant growth perpetuity:

$$V^U = \frac{\$1.75\ million}{8.43\% - 3.50\%} = \$35.50\ million$$

   To compute Harris Solution's levered value, we calculate its WACC:

$$WACC = \frac{E}{E+D}r_E + \frac{D}{E+D}r_D(1-\tau_c) = \left(\frac{1}{1+2.5}\right)12\% + \left(\frac{2.5}{1+2.5}\right)7\%(1-0.40) = 6.43\%$$

   Thus, Harris Solution's value including the interest tax shield is

$$V^L = \frac{\$1.75\ million}{6.43\% - 3.50\%} = \$59.73\ million$$

   The value of the interest tax shield is therefore:

$$PV(Interest\ Tax\ Shield) = V^L - V^U = \$59.73 - \$35.50 = \$24.23\ million$$

4. (Example 4 in the Note)
   Suppose Midco still chooses to borrow $100 million, but wishes to repurchase $125 million worth of its shares. What is the lowest price it could offer and expect shareholders to tender their shares?

   Solution)

Repurchase Price	Shares Repurchased (millions)	Shares Remaining (millions)	New Share Price
P_R	$R = \frac{125}{P_R}$	$N = 20 - R$	$P_N = \frac{221}{N}$
$16.30	7.67	12.33	$17.92
$16.55	7.55	12.45	$17.66
$16.80	7.44	12.56	$17.60
$17.05	7.33	12.67	$17.44
$17.30	**7.23**	**12.77**	**$17.30**
$17.55	7.12	12.88	$17.16
$17.80	7.02	12.98	$17.03

5. (Example 5 in the Note)
Given the following tax rates:

Year	Corporate Tax Rate	Average Personal Tax Rate on Equity Income	Average Personal Tax Rate on Interest Income
1985	46%	35%	50%
1995	35%	34%	28%
2009	35%	15%	35%

What is the effective tax advantage of debt for each of the years listed?

Solution)

$$\tau^* = 1 - \frac{(1-\tau_c)(1-\tau_e)}{(1-\tau_i)}$$

$$\tau^*_{1985} = 1 - \frac{(1-0.46)(1-0.35)}{(1-0.50)} = 29.8\%$$

$$\tau^*_{1995} = 1 - \frac{(1-0.35)(1-0.34)}{(1-0.28)} = 40.4\%$$

$$\tau^*_{2009} = 1 - \frac{(1-0.35)(1-0.15)}{(1-0.35)} = 15.0\%$$

6. (Example 6 in the Note)
   Estimate the value of Midco if it goes through with the $100 million recapitalization, accounting for personal taxes at their 1980 levels.

   Solution)
   From the Example in the Note, we know τ^* in 1980 was 8.2%. Given Midco's current value of $V^U = \$300\ million$, V^L is estimated as $V^U + \tau^* D = \$300\ million + 8.2\%(\$100\ million) = \$308.20$.
   With $20\ million$ original shares outstanding, the stock price would increase by $\frac{\$8.2\ million}{20\ million\ shares} = \$0.41\ per\ shares$.