1. a) $PV = \frac{FV}{1+6\%} = 943.40$

b) $PV = \frac{PMT}{1+2.5\%} + \frac{PMT+FV}{1+3.5\%} = 1,000$

c) P&L of a buy-and-hold investor is unchanged if there is no reinvestment risk of the security.

d) $PV_{new} = \frac{PMT}{1+3\%} + \frac{PMT+FV}{1+3\%} = 1009.57$

$P\&L = 1009.57 - 1,000 = 9.57$

2. a) $PV = -102$, $FV = 100$ $N = 10$, $PMT = 6$ $\rightarrow$ CPT $I/Y = 5.73\%$

b) $PV = -102$, $FV = 102$, $N = 5$, $PMT = 6$ $\rightarrow$ CPT $I/Y = 5.88\%$

c) $PV = -102$, $FV = 100$, $N = 8$, $PMT = 6$ $\rightarrow$ CPT $I/Y = 5.68\%$

d) Yield-to-worst is $\min(5.73\%, 5.88\%, 5.68\%)$

3. a) $t = \frac{-20.0\% - 10.5\%}{18\%} = 1.68$ by the t-table, we conclude that such probability is less than 5%.

b) $-1.96 = \frac{x_1 - 10.5\%}{18\%} \Rightarrow x_1 = -24.78\%$ 35.28

$1.96 = \frac{x_2 - 10.5\%}{18\%} \Rightarrow x_2 = 45.78\%$

c) The minimum required rate of return is

$r = 102/100 - 1 = 2\%$

$$SFrate_1 = \frac{3\% - 2\%}{1\%} = 1.00$$

$$SFrate_2 = \frac{6\% - 2\%}{3.5\%} = 1.14 \quad \leftarrow \text{most desirable}$$

$$SFrate_3 = \frac{10.5\% - 2\%}{18\%} = 0.47$$

d) Expected return: $10.5\% \times 20\% + 3\% \times 30\% + 6\% \times 50\% = 6\%$

Variance : $(18\%)^2 \times (20\%)^2 + (3\%)^2 \times (30\%)^2 + (6\%)^2 \times (50\%)^2 = 0.023$

standard error: $\sqrt{0.023} = 15.17\%$

4. a) dependent variable: Excess return of ABC common stock
independent variable: Excess return of S&P 500

b) $R^2 = \frac{SSR}{SST} = 1 - \frac{SSE}{SST} = 1 - \frac{12423}{20135} = 0.383$

c) $\beta_1 = \frac{0.000541}{0.000416} = 1.3005$

$\beta_0 = \bar{y} - \beta_1 \bar{x} = (6.3\% - 1.5\%) - 1.3005(4.5\% - 1.5\%) = 0.8985$

d) $F = \frac{MSR}{MSE} = \frac{SSR}{SSE/n-1} = \frac{20135 - 12423}{12423/101} = 62.6992$

5. a) MacDur = 4 since it is a zero-coupon bond

b) YTM = $4\% + 6.3\% + 2.20\% = 10.5\%$

ModDur = MacDur / $1 + YTM\%$ = 3.619

c) $PV = \frac{FV}{(1+YTM)^4} = 670.7$

Money duration = \$10 mil × 0.6707 × 3.6199 = \$2.4279 kilo

d) YTM = 10.49% → PV = 670.98

YTM = 10.51% → PV = 670.49

PVBP = (670.98 − 670.49)/2 = 0.2450