# ***Correction of the TD Exam***

## ***Solution 1:*** **(7pts)**

***Returns Table:***

| Scenario | Probability | Short Bond (%) | Long Bond (%) | Stock(%) | Market(%) | Gold(%) |
|---|---|---|---|---|---|---|
| **Depression** | 0.1 | 1 | 2 | -25 | -10 | 15 |
| **Recession** | 0.2 | 3 | 4 | -5 | -5 | 10 |
| **Normal** | 0.2 | 3 | 4 | 15 | 10 | 00 |
| **Growth** | 0.4 | 3 | 4 | 20 | 15 | -5 |
| **Boom** | 0.1 | 5 | 6 | 25 | 20 | -5 |

***Expected Return, Variance, and Standard Deviation:***

| Asset | Expected Return (1.25pts) | Variance (2.5pts) | Standard Deviation (1 pt) | Coefficient of Variation (1.25pts) |
|---|---|---|---|---|
| **Short Bond** | 3 | 0.8 | 0.89 | 0.29 |
| **Long Bond** | 4 | 0.8 | 0.89 | 0.22 |
| **Stock** | 10 | 235 | 15.32 | 1.53 |
| **Market** | 8 | 101 | 10.04 | 1.25 |
| **Gold** | 1 | 54 | 7.34 | 7.34 |

***Investor Choice:***

To determine the **best assets** for a **Risk-averse investor**, w e calculate the coefficient of variation (CV) for each asset, and from the results, a **risk-averse investor** should choose the **Long Bond**, as it has the **lowest** coefficient of variation **(CV= 0.22)** which means it offers the least risk per unit of return among all the assets. **(1pt)**

## ***Solution 2:*** **(5pts)**

***Dividends:***

- D1=3.50
- D2=4.00
- D3=4.50

***Discount Rates:***

- r1=12%
- r2=5.5% (semi-annual)
- $r_3$=undetermined
- **Terminal Value: $ 159**

**Step 1: Discount the Cash Flows**

$$P\,0 = \frac{D1}{(1+r1)^1} + \frac{D2}{(1+r2)^2} + \frac{D_3}{(1+r_3)^3} + \frac{P_3}{(1+r_3)^3}$$

$$P\,0 = \frac{3.5}{(1+0.12)^1} + \frac{4}{(1+r2)^2} + \frac{4.5}{(1+r_3)^3} + \frac{159}{(1+r_3)^3}$$

- We calculate the **present value (PV)** of each dividend:

***Year 1 Dividend:*** **(0.5pt)**

$$PV_{\,1} = \frac{3.5}{(1+0.12)^1} = 3.12$$

***Year 2 Dividend:*** **(1pt)**

r2=5.5% (semi-annual)

$R_{\text{Annual}} = [(1+R_{\text{Semi-annual}})^2 - 1]$

$R_{2\ \text{Annual}} = (1+0.055)^2 - 1 = 1.113025 - 1 = 0.11$

$r_2 = 11\%$ → **(0.5pts)**

$$PV_{\,2} = \frac{4}{(1+0.11)^2} = 3.25$$ → **(0.5pts)**

***Year 3 Dividend:*** **(2pts)**

- $r_3$=undetermined
- **Terminal Value: $ 159**

$$PV_{\,3} = \frac{4.5}{(1+r_3)^3} = ?$$

$$PV\ (TV_{\,3}) = \frac{P_3}{(1+r_3)^3} = \frac{\frac{D^4}{(r^3-g)}}{(1+r_3)^3} = \frac{\frac{D^3(1+g)}{(r^3-g)}}{(1+r_3)^3}$$

$d4 = d3(1 + g) = 4.5(1 + 0.06) = 4.77 \rightarrow$ **(0.5pt)**

$TV_3 = 159 = \frac{4.77}{(r3 - g)} = \frac{4.77}{(r3 - 0.06)}$

$159\ (r_3 - g) = 4.77$

$159r_3 - 159\ g = 4.77$

$159r_3 - 159\ (0.06) = 4.77$

$159r_3 - 9.54 = 4.77$

$159r_3 = 4.77 + 9.54 = 14.31$

$R_3 = \frac{14.31}{159} = 0.09$

**$R_3 = 9\%$** $\rightarrow$ **(1pt)**

$PV_3 = \frac{4.5}{(1+0.09)^3} = 3.47 \rightarrow$ **(0.5pt)**

- We calculate the **present value (PV)** of the terminal value (TV): **(0.5pt)**

$$PV\ (TV_3) = \frac{Pn}{(1 + r_3)^3} = \frac{p3}{(1 + r_3)^3} = \frac{159}{(1 + 0.09)^3} = 122.77$$

**Step 3: Calculating the Intrinsic Value of the Company's Stock** **(1pt)**

Intrinsic Value = $PV_1 + PV_2 + PV_3 + PV_{TV}$

Intrinsic Value = $3.12 + 3.25 + 3.47 + 122.77 = \$132.61$