1. Assume that, based on past data, the following table summarizes the stock returns with their probabilities.

<table>
<thead>
<tr>
<th></th>
<th>Return (%)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>IBM</td>
<td>17</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Calculate the expected returns on the two stocks. Then calculate the standard deviations of these returns. Based on your calculations which stock will you prefer?

**Solution:** Expected return on Apple and IBM

\[
R_{eA} = 12 \times 0.5 + 4 \times 0.5 = 8\% \\
R_{eI} = 17 \times 0.4 + 2 \times 0.6 = 8\%
\]

Variances of these returns

\[
Var(R_A) = 0.5 \times (12 - 8)^2 + 0.5 \times (4 - 8)^2 = 16 \\
Var(R_A) = 0.4 \times (17 - 8)^2 + 0.6 \times (2 - 8)^2 = 54
\]

Standard deviations:

\[
StdDev(R_A) = \sqrt{16} = 4 \\
StdDev(R_I) = \sqrt{54} = 3\sqrt{6}
\]

Conclusion: \( R_{eA} = R_{eI} \), but \( StdDev(R_A) < StdDev(R_I) \). Therefore, choose Apple.

2. Thomas Brothers is expected to pay a $0.50 per share dividend at the end of the year (i.e., \( D_1 = $0.50 \)). The dividend is expected to grow at a constant rate of 7% a year. The required rate of return on stock, \( k_e \), is 15%. What is the value per share of the company’s stock?

**Solution:**

\[
D_1 = \$0.50; g = 7\%; k_e = 15\%; P_0 = ? \\
P_0 = \frac{D_1}{k_e - g} = \frac{0.5}{0.15 - 0.07} = 6.25
\]

3. A stock is trading at $80 per share. The stock is expected to have a year-end dividend of $4 per share (\( D_1 = 4 \)), which is expected to grow at some constant rate \( g \) throughout time. The stock’s required rate of return is 14%. If you are an analyst who believes in efficient markets, what would be your forecast of \( g \).

**Solution:** The problem asks you to determine the constant growth rate, given the following facts:

\[ P_0 = $80, D_1 = $4, \text{ and } k_e = 14\% \]
Use the constant growth rate formula to calculate \( g \):

\[
P_0 = \frac{D_1}{k_e - g} \quad \text{or} \quad g = k_e - \frac{D_1}{P_0}
\]

Thus

\[
g = 0.14 - \frac{4}{80} = 0.14 - 0.05 = 0.09 \text{ or } 9\%.
\]

4. A stock is trading at $80 per share. The stock is expected to have a year-end dividend of $4 per share \((D_1 = 4)\), which is expected to grow at 9% throughout time. If you are the buyer of this stock, what is your required rate of return?

**Solution:** The problem asks you to determine the required rate of return, \( k_e \), given the following facts:

\[
P_0 = $80, D_1 = $4, \text{ and } g = 9\%
\]

Use the constant growth rate formula to calculate \( g \):

\[
P_0 = \frac{D_1}{k_e - g} \quad \text{or} \quad k_e = g + \frac{D_1}{P_0}
\]

Thus

\[
k_e = 9 + \frac{4}{80} = 0.09 + 0.05 = 0.14 \text{ or } 14\%.
\]