1. The common stock of Dilcher Corporation pays a quarterly dividend with the next dividend payable later today. The next dividend will be 3.50. Each dividend thereafter is expected to be 0.50 higher than the previous dividend. In other words, the first dividend will be 3.50. The second dividend will be 4.00. The third dividend will be 4.50, etc.

Using the dividend discount method, calculate the price of this stock to yield 8.8% compounded quarterly.

Solution:

Use P&Q formula for perpetuity due since the next payment is later today

\[
P = 3.50, Q = 0.50, i = \frac{0.088}{4} = 0.022
\]

\[
PV = \left[ \frac{P}{i} + \frac{Q}{i^2} \right] (1 + i) = \left[ \frac{3.5}{0.022} + \frac{0.50}{(0.022)^2} \right] (1.022) = 1218.38
\]
2. You are given the following spot interest rate yield curve:

<table>
<thead>
<tr>
<th>Time (t)</th>
<th>Spot Rate (r_t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>2.2</td>
</tr>
<tr>
<td>1.0</td>
<td>2.4</td>
</tr>
<tr>
<td>1.5</td>
<td>2.7</td>
</tr>
<tr>
<td>2.0</td>
<td>3.1</td>
</tr>
<tr>
<td>2.5</td>
<td>3.5</td>
</tr>
<tr>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td>4.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Calculate the price of a three year bond with annual coupons of 100 and a maturity value of 1400.

**Solution:**

\[
PV = \frac{100}{1.024} + \frac{100}{(1.031^2)} + \frac{1500}{(1.04^3)} = 1525.23
\]
3. You are given the following two bonds:

   a. Bond A is a one year bond with annual coupons of 50 and a maturity value of 1000. Bond A can be bought for 995.

   b. Bond B is a two year bond with annual coupons of 70 and a maturity value of 1000. Bond B can be bought for 990.

Calculate \( f_{[1,2]} \)

**Solution:**

**Bond A:**

\[
995 = \frac{1050}{(1 + r_1)}
\]

\( r_1 = 0.055276382 \)

**Bond B:**

\[
990 = \frac{70}{(1 + r_1)} + \frac{1070}{(1 + r_2)^2} = \frac{70}{1.055276382} + \frac{1070}{(1 + r_2)^2}
\]

\( r_2 = 0.076302263 \)

\( (1 + r_1)(1 + f_{[1,2]}) = (1 + r_2)^2 \)

\( (1.055276382)(1 + f_{[1,2]}) = (1.076302263)^2 \)

\( f_{[1,2]} = 0.097747075 \)