Chapter 2

2-4 \( r_{RF} = 6\%; \ r_{M} = 13\%; \ b = 0.7; \ r_s = ? \)

\[
r_s = r_{RF} + (r_{M} - r_{RF})b
    = 6\% + (13\% - 6\%)0.7
    = 10.9\%.
\]

2-5 a. \( \hat{r}_m = (0.3)(15\%) + (0.4)(9\%) + (0.3)(18\%) = 13.5\% \)

\( \hat{r}_j = (0.3)(20\%) + (0.4)(5\%) + (0.3)(12\%) = 11.6\% \)

b. \( \sigma_M = \sqrt{(0.3)(15\% - 13.5\%)^2 + (0.4)(9\% - 13.5\%)^2 + (0.3)(18\% - 13.5\%)^2} \)

\[
= \sqrt{14.85\%} = 3.85\%.
\]

\( \sigma_J = \sqrt{(0.3)(20\% - 11.6\%)^2 + (0.4)(5\% - 11.6\%)^2 + (0.3)(12\% - 11.6\%)^2} \)

\[
= \sqrt{38.64\%} = 6.22\%.
\]

c. \( CV_M = \frac{3.85\%}{13.5\%} = 0.29 \)

\( CV_J = \frac{6.22\%}{11.6\%} = 0.54 \)

2-7 a. \( r_i = r_{RF} + (r_{M} - r_{RF})b_i = 9\% + (14\% - 9\%)1.3 = 15.5\% \)

b. 1. \( r_{RF} \) increases to 10%:

\( r_M \) increases by 1 percentage point, from 14% to 15%.

\( r_i = r_{RF} + (r_{M} - r_{RF})b_i = 10\% + (15\% - 10\%)1.3 = 16.5\% \)

2. \( r_{RF} \) decreases to 8%:

\( r_M \) decreases by 1%, from 14% to 13%.

\( r_i = r_{RF} + (r_{M} - r_{RF})b_i = 8\% + (13\% - 8\%)1.3 = 14.5\% \)

c. 1. \( r_M \) increases to 16%:

\( r_i = r_{RF} + (r_{M} - r_{RF})b_i = 9\% + (16\% - 9\%)1.3 = 18.1\% \)

2. \( r_M \) decreases to 13%:

\( r_i = r_{RF} + (r_{M} - r_{RF})b_i = 9\% + (13\% - 9\%)1.3 = 14.2\% \)
2-9 Portfolio beta = \[
\begin{align*}
&= \frac{\$400,000}{\$4,000,000} (1.50) + \frac{\$600,000}{\$4,000,000} (-0.50) \\
&+ \frac{\$1,000,000}{\$4,000,000} (1.25) + \frac{\$2,000,000}{\$4,000,000} (0.75) \\
&= 0.1(1.5) + (0.15)(-0.50) + (0.25)(1.25) + (0.5)(0.75) \\
&= 0.15 - 0.075 + 0.3125 + 0.375 = 0.7625.
\end{align*}
\]

\[r_p = r_{RF} + (r_M - r_{RF})(b_p) = 6\% + (14\% - 6\%)(0.7625) = 12.1\%.
\]

Alternative solution: First computes the return for each stock using the CAPM equation \([r_{RF} + (r_M - r_{RF})b]\), and then compute the weighted average of these returns.

\[
\begin{array}{c|c|c|c|c}
\text{Stock} & \text{Investment} & \text{Beta} & r = r_{RF} + (r_M - r_{RF})b & \text{Weight} \\
\hline
A & \$ 400,000 & 1.50 & 18\% & 0.10 \\
B & 600,000 & (0.50) & 2 & 0.15 \\
C & 1,000,000 & 1.25 & 16 & 0.25 \\
D & 2,000,000 & 0.75 & 12 & 0.50 \\
\hline
\text{Total} & \$4,000,000 & & & 1.00 \\
\end{array}
\]

\[r_p = 18\%(0.10) + 2\%(0.15) + 16\%(0.25) + 12\%(0.50) = 12.1\%.
\]

2-10 First, calculate the beta of what remains after selling the stock:

\[b_p = 1.1 = \frac{\$100,000}{\$2,000,000}0.9 + \frac{\$1,900,000}{\$2,000,000}b_R \
1.1 = 0.045 + (0.95)b_R \\
b_R = 1.1105.
\]

\[b_N = (0.95)1.1105 + (0.05)1.4 = 1.125.
\]
3-1  a. A plot of the approximate regression line is shown in the following figure:

The equation of the regression line is

\[ r_i = a + b_r M_i. \]

The stock's approximate beta coefficient is given by the slope of the regression line:

\[ b = \text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta Y}{\Delta X} = \frac{23 - (-14)}{37.2 - (-26.5)} = \frac{37}{63.7} = 0.6. \]

The intercept, \( a \), seems to be about 3.5. Using a calculator with a least squares regression routine, we find the exact equation to be

\[ r_X = 3.7 + 0.56 M, \] with \( r = 0.96. \]
b. The arithmetic average return for Stock X is calculated as follows:

\[
\bar{r}_{\text{Avg}} = \frac{(-14.0 + 23.0 + \ldots + 18.2)}{7} = 10.6\%.
\]

The arithmetic average rate of return on the market portfolio, determined similarly, is 12.1%.

For Stock X, the estimated standard deviation is 13.1 percent:

\[
\sigma_X = \sqrt{\frac{(-14.0 - 10.6)^2 + (23.0 - 10.6)^2 + \ldots + (18.2 - 10.6)^2}{7-1}} = 13.1\%.
\]

The standard deviation of returns for the market portfolio is similarly determined to be 22.6 percent. The results are summarized below:

<table>
<thead>
<tr>
<th></th>
<th>Stock X</th>
<th>Market Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average return, (\bar{r}_{\text{Avg}})</td>
<td>10.6%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Standard deviation, (\sigma)</td>
<td>13.1%</td>
<td>22.6%</td>
</tr>
</tbody>
</table>

Several points should be noted: (1) \(\sigma_M\) over this particular period is higher than the historic average \(\sigma_M\) of about 15 percent, indicating that the stock market was relatively volatile during this period; (2) Stock X, with \(\sigma_X = 13.1\%\), has much less total risk than an average stock, with \(\sigma_{\text{Avg}} = 22.6\%\); and (3) this example demonstrates that it is possible for a very low-risk single stock to have less risk than a portfolio of average stocks, since \(\sigma_X < \sigma_M\).

c. Since Stock X is in equilibrium and plots on the Security Market Line (SML), and given the further assumption that \(^^\text{\hat{r}}_X = ^\text{\hat{r}}_M\) and \(^\text{\hat{r}}_M = ^\text{\hat{r}}_M\)--and this assumption often does not hold--then this equation must hold:

\[
\bar{r}_X = r_{\text{RF}} + (\bar{r} - r_{\text{RF}})b_X.
\]

This equation can be solved for the risk-free rate, \(r_{\text{RF}}\), which is the only unknown:

\[
\begin{align*}
10.6 &= r_{\text{RF}} + (12.1 - r_{\text{RF}})0.56 \\
10.6 &= r_{\text{RF}} + 6.8 - 0.56r_{\text{RF}} \\
0.44r_{\text{RF}} &= 10.6 - 6.8 \\
r_{\text{RF}} &= 3.8 / 0.44 = 8.6\%.
\end{align*}
\]
d. The SML is plotted below. Data on the risk-free security \( (b_{RF} = 0, r_{RF} = 8.6\%) \) and Security X \( (b_X = 0.56, r_X = 10.6\%) \) provide the two points through which the SML can be drawn. \( r_M \) provides a third point.

![SML Diagram]

\[ r(\%) \]
\[ r_{RF} = 8.6\% \]
\[ r_X = 10.6\% \]

1.0 2.0

Beta

\[ r_i = r_{RF} + (r_X - r_{RF})b_i = 7\% + (1.1)(6.5\%) = 14.5\% \]

\[ r_i = r_{RF} + (r_M - r_{RF})b_i + (r_{SMB})c_i + (r_{HML})d_i \]
\[ = 7\% + (1.1)(6.5\%) + (5\%)(0.7) + (4\%)(-0.3) = 16.45\% \]

3-4
a. Using the CAPM:
\[ r_i = r_{RF} + (r_X - r_{RF})b_i = 7\% + (1.1)(6.5\%) = 14.5\% \]

b. Using the 3-factor model:
\[ r_i = r_{RF} + (r_M - r_{RF})b_i + (r_{SMB})c_i + (r_{HML})d_i \]
\[ = 7\% + (1.1)(6.5\%) + (5\%)(0.7) + (4\%)(-0.3) = 16.45\% \]

e. In theory, you would be indifferent between the two stocks. Since they have the same beta, their relevant risks are identical, and in equilibrium they should provide the same returns. The two stocks would be represented by a single point on the SML. Stock Y, with the higher standard deviation, has more diversifiable risk, but this risk will be eliminated in a well-diversified portfolio, so the market will compensate the investor only for bearing market or relevant risk. In practice, it is possible that Stock Y would have a slightly higher required return, but this premium for diversifiable risk would be small.
Chapter 4

4-1  With your financial calculator, enter the following:

\[ N = 10; \ I = \text{YTM} = 9\%; \ PMT = 0.08 \times 1,000 = 80; \ FV = 1000; \ PV = V_B = ? \]
\[ PV = 935.82. \]

Alternatively,

\[ V_B = 80(\text{PVIFA}_{9\%,10}) + 1,000(\text{PVIF}_{9\%,10}) \]
\[ = 80((1 - 1/1.09^{10})/0.09) + 1,000(1/1.09^{10}) \]
\[ = 80(6.4177) + 1,000(0.4224) \]
\[ = 513.42 + 422.40 = 935.82. \]

4-3  With your financial calculator, enter the following to find YTM:

\[ N = 10 \times 2 = 20; \ PV = -1100; \ PMT = 0.08/2 \times 1,000 = 40; \ FV = 1000; \ I = \text{YTM} = ? \]
\[ YTM = 3.31\% \times 2 = 6.62\%. \]

With your financial calculator, enter the following to find YTC:

\[ N = 5 \times 2 = 10; \ PV = -1100; \ PMT = 0.08/2 \times 1,000 = 40; \ FV = 1050; \ I = \text{YTC} = ? \]
\[ YTC = 3.24\% \times 2 = 6.49\%. \]

4-6  a. \[ V_B = \text{PMT}(\text{PVIFA}_{i,n}) + \text{FV}(\text{PVIF}_{i,n}) \]
\[ = \text{PMT}((1- 1/(1+i)^n))/i) + \text{FV}(1/(1+i)^n) \]

1. 5\%: Bond L: \[ V_B = 100(10.3797) + 1,000(0.4810) = 1,518.97. \]
   Bond S: \[ V_B = (100 + 1,000)(0.9524) = 1,047.64. \]

2. 8\%: Bond L: \[ V_B = 100(8.5595) + 1,000(0.3152) = 1,171.15. \]
   Bond S: \[ V_B = (100 + 1,000)(0.9259) = 1,018.49. \]

3. 12\%: Bond L: \[ V_B = 100(6.8109) + 1,000(0.1827) = 863.79. \]
   Bond S: \[ V_B = (100 + 1,000)(0.8929) = 982.19. \]

Calculator solutions:

1. 5\%: Bond L: Input \( N = 15, \ I = 5, \ PMT = 100, \ FV = 1000, \ PV = ?, \ PV = 1,518.98. \)
   Bond S: Change \( N = 1, \ PV = ? \) \( PV = 1,047.62. \)

2. 8\%: Bond L: From Bond S inputs, change \( N = 15 \) and \( I = 8, \ PV = ?, \ PV = 1,171.19. \)
   Bond S: Change \( N = 1, \ PV = ? \) \( PV = 1,018.52. \)

3. 12\%: Bond L: From Bond S inputs, change \( N = 15 \) and \( I = 12, \ PV = ? \ PV = 863.78. \)
   Bond S: Change \( N = 1, \ PV = ? \) \( PV = 982.14. \)
b. Think about a bond that matures in one month. Its present value is influenced primarily by the maturity value, which will be received in only one month. Even if interest rates double, the price of the bond will still be close to $1,000. A one-year bond's value would fluctuate more than the one-month bond's value because of the difference in the timing of receipts. However, its value would still be fairly close to $1,000 even if interest rates doubled. A long-term bond paying semiannual coupons, on the other hand, will be dominated by distant receipts, receipts which are multiplied by \(1/(1 + r_d/2)^t\), and if \(r_d\) increases, these multipliers will decrease significantly. Another way to view this problem is from an opportunity point of view. A one-month bond can be reinvested at the new rate very quickly, and hence the opportunity to invest at this new rate is not lost; however, the long-term bond locks in subnormal returns for a long period of time.

4-9 a. \$1,100 = \$60(PVIFA_{r_d/2,20}) + \$1,000(PVIF_{r_d/2,20})

Using a financial calculator, input the following:

\(N = 20, PV = -1100, PMT = 60, FV = 1000\), and solve for I = 5.1849%.

However, this is a periodic rate. The nominal annual rate = 5.1849\%(2) = 10.3699% ≈ 10.37%.

b. The current yield = \$120/$1,100 = 10.91%.

c. \(YTM = \text{Current Yield} + \text{Capital Gains (Loss) Yield}
\quad 10.37\% = 10.91\% + \text{Capital Loss Yield}
\quad -0.54\% = \text{Capital Loss Yield}.

d. \$1,100 = \$60(PVIFA_{r_d/2,8}) + \$1,060(PVIF_{r_d/2,8}).

Using a financial calculator, input the following:

\(N = 8, PV = -1100, PMT = 60, FV = 1060\), and solve for I = 5.0748%.

However, this is a periodic rate. The nominal annual rate = 5.0748\%(2) = 10.1495% ≈ 10.15%. 
4-13 a. The bonds now have an 8-year, or a 16-semiannual period, maturity, and their value is calculated as follows:

\[ V_B = \sum_{i=1}^{16} \frac{50}{(1.03)^i} + \frac{1,000}{(1.03)^i} = 50(12.5611) + 1,000(0.6232) \]
\[ = 628.06 + 623.20 = 1,251.26. \]

Calculator solution: Input N = 16, I = 3, PMT = 50, FV = 1000, PV = ?. PV = $1,251.22.

b. \[ V_B = 50(10.1059) + 1,000(0.3936) = 505.30 + 393.60 = 898.90. \]

Calculator solution: Change inputs from Part a to I = 6, PV = ?. PV = $898.94.

c. The price of the bond will decline toward $1,000, hitting $1,000 (plus accrued interest) at the maturity date 8 years (16 six-month periods) hence.
5-1  \( D_0 = $1.50; \ g_{1-3} = 5\%; \ g_n = 10\%; \ D_1 \text{ through } D_5 = ? \)

\[
\begin{align*}
D_1 &= D_0 (1 + g_1) = $1.50 (1.05) = $1.5750. \\
D_2 &= D_0 (1 + g_1)(1 + g_2) = $1.50 (1.05)^2 = $1.6538. \\
D_3 &= D_0 (1 + g_1)(1 + g_2)(1 + g_3) = $1.50 (1.05)^3 = $1.7364. \\
D_4 &= D_0 (1 + g_1)(1 + g_2)(1 + g_3)(1 + g_n) = $1.50 (1.05)^3 (1.10) = $1.9101. \\
D_5 &= D_0 (1 + g_1)(1 + g_2)(1 + g_3)(1 + g_n)^2 = $1.50 (1.05)^3 (1.10)^2 = $2.1011.
\end{align*}
\]

5-3  \( P_0 = $20; \ D_0 = $1.00; \ g = 10\%; \ P\hat{t} = ?; \ \hat{r}_s = ? \)

\[
\begin{align*}
P\hat{t} &= P_0 (1 + g) = $20 (1.10) = $22. \\
\hat{r}_s &= \frac{D_0}{P_0} + g = \frac{$1.00 (1.10)}{$20} + 0.10 \\
&= \frac{$1.10}{$20} + 0.10 = 15.50\%. \quad \hat{r}_s = 15.50\%.
\end{align*}
\]

5-4  \( D_{ps} = $5.00; \ V_{ps} = $60; \ r_{ps} = ? \)

\[
\begin{align*}
r_{ps} &= \frac{D_{ps}}{V_{ps}} = \frac{$5.00}{$60.00} = 8.33\%.
\end{align*}
\]
The problem asks you to determine the value of $\hat{P}$, given the following facts: $D_1 = $2, $b = 0.9$, $r_{RF} = 5.6\%$, $RPM = 6\%$, and $P_0 = $25. Proceed as follows:

Step 1: Calculate the required rate of return:

$$r_s = r_{RF} + (r_M - r_{RF})b = 5.6\% + (6\%)0.9 = 11\%.$$  

Step 2: Use the constant growth rate formula to calculate $g$:

$$\hat{r}_s = \frac{D_1}{P_0} + g$$

$$0.11 = \frac{2}{25} + g$$

$$g = 0.03 = 3\%.$$  

Step 3: Calculate $\hat{P}_3$:

$$\hat{P}_3 = P_0(1 + g)^3 = $25(1.03)^3 = $27.3182 \approx $27.32.$$  

Alternatively, you could calculate $D_4$ and then use the constant growth rate formula to solve for $\hat{P}_3$:

$$D_4 = D_3(1 + g)^3 = $2.00(1.03)^3 = $2.1855.$$  

$$\hat{P}_3 = $2.1855/(0.11 - 0.03) = $27.3188 \approx $27.32.$$  

5-12 Calculate the dividend stream and place them on a time line. Also, calculate the price of the stock at the end of the supernormal growth period, and include it, along with the dividend to be paid at $t = 5$, as $CF_5$. Then, enter the cash flows as shown on the time line into the cash flow register, enter the required rate of return as $I = 15\%$, and then find the value of the stock using the NPV calculation. Be sure to enter $CF_0 = 0$, or else your answer will be incorrect.

$D_0 = 0$; $D_1 = 0$, $D_2 = 0$, $D_3 = 1.00$  
$D_4 = 1.00(1.5) = 1.5$;  $D_5 = 1.00(1.5)^2 = 2.25$;  $D_6 = 1.00(1.5)^2(1.08) = $2.43.  
$\hat{P}_0 = ?$  

\[
\begin{array}{cccccc}
0 & r_s = 15\% & 1 & 2 & 3 & g = 50\% & 4 & 5 & g = 8\% & 6 \\
0.66 & & & 1.00 & 1.50 & 2.25 & & \frac{34.71}{36.96} & 0.15 - 0.08 & \\
0.86 & & & & & & & & & \\
18.38 & & & & & & & & & \\
\hline
\end{array}
\]

$19.89 = \hat{P}_0$

$\hat{P}_3 = D_6/(r_s - g) = 2.43/(0.15 - 0.08) = 34.71$. This is the price of the stock at the end of Year 5.  

$CF_0 = 0$; $CF_{1-2} = 0$; $CF_3 = 1.0$; $CF_4 = 1.5$; $CF_5 = 36.96$; $I = 15\%.$
With these cash flows in the CFLO register, press NPV to get the value of the stock today: \( NPV = \$19.89 \).

5-14

<table>
<thead>
<tr>
<th></th>
<th>( g = 5% )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>D_0</td>
<td>2.00</td>
<td>D_1</td>
<td>D_2</td>
<td>D_3</td>
<td>D_4</td>
</tr>
</tbody>
</table>

a. \( D_1 = 2.00 \times (1.05) = 2.10 \). \( D_2 = 2.00 \times (1.05)^2 = 2.21 \). \( D_3 = 2.00 \times (1.05)^3 = 2.32 \).

b. \( PV = 2.10 \times 0.8929 + 2.21 \times 0.7972 + 2.32 \times 0.7118 = 5.29 \).

Calculator solution: Input 0, 2.10, 2.21, and 2.32 into the cash flow register, input \( I = 12 \), \( PV = ? \). \( PV = 5.29 \).

c. \( 34.73 \times 0.7118 = 24.72 \).

Calculator solution: Input 0, 0, 0, and 34.73 into the cash flow register, \( I = 12 \), \( PV = ? \). \( PV = 24.72 \).

d. \( 24.72 + 5.29 = 30.01 = \) Maximum price you should pay for the stock.

e. \( \hat{P}_s = \frac{D_0(1 + g)}{r_s - g} = \frac{D_1}{r_s - g} = \frac{2.10}{0.12 - 0.05} = 30.00 \).

f. The value of the stock is not dependent upon the holding period. The value calculated in Parts a through d is the value for a 3-year holding period. It is equal to the value calculated in Part e except for a small rounding error. Any other holding period would produce the same value of \( \hat{P}_s \); that is, \( \hat{P}_s = 30.00 \).

5-15

a. \( g = \frac{1.1449}{1.07} - 1.0 = 7\% \).

Calculator solution: Input \( N = 1 \), \( PV = -1.07 \), \( PMT = 0 \), \( FV = 1.1449 \), \( I = ? \). \( I = 7.00\% \).

b. \( 1.07/21.40 = 5\% \).

c. \( \hat{r}_s = \frac{D_1}{P_0} + g = \frac{1.07}{21.40} + 7\% = 5\% + 7\% = 12\% \).
a. End of Year:

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0</td>
<td>1.75</td>
<td>D1</td>
<td>D2</td>
<td>D3</td>
<td>D4</td>
<td>D5</td>
<td>D6</td>
</tr>
<tr>
<td>D  t = D0(1 + g)t</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>$1.75(1.15) = $2.01.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D2</td>
<td>$1.75(1.15)^2 = $1.75(1.3225) = $2.31.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D3</td>
<td>$1.75(1.15)^3 = $1.75(1.5209) = $2.66.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>$1.75(1.15)^4 = $1.75(1.7490) = $3.06.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td>$1.75(1.15)^5 = $1.75(2.0114) = $3.52.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Step 1

PV of dividends = \[ \sum_{t=1}^{5} \frac{D_t}{(1 + r)^t} \]

PV D1 = $2.01(PVIF_{12\%,1}) = $2.01(0.8929) = $1.79
PV D2 = $2.31(PVIF_{12\%,2}) = $2.31(0.7972) = $1.84
PV D3 = $2.66(PVIF_{12\%,3}) = $2.66(0.7118) = $1.89
PV D4 = $3.06(PVIF_{12\%,4}) = $3.06(0.6355) = $1.94
PV D5 = $3.52(PVIF_{12\%,5}) = $3.52(0.5674) = $2.00

PV of dividends = $9.46

Step 2

\[ \hat{P}_5 = \frac{D_6}{r - g} = \frac{D_6(1 + g)}{r - g} = \frac{3.52(1.05)}{0.12 - 0.05} = \frac{3.70}{0.07} = 52.80. \]

This is the price of the stock 5 years from now. The PV of this price, discounted back 5 years, is as follows:

PV of \( \hat{P}_5 \) = $52.80(PVIF_{12\%,5}) = $52.80(0.5674) = $29.96.

Step 3

The price of the stock today is as follows:

\( \hat{P}_0 \) = PV dividends Years 1 through 5 + PV of \( \hat{P}_5 \)

= $9.46 + $29.96 = $39.42.

This problem could also be solved by substituting the proper values into the following equation:

\[ \hat{P}_0 = \sum_{t=1}^{5} \frac{D_t(1 + g)}{(1 + r)^t} + \left( \frac{D_6}{r - g} \right) \left( \frac{1}{1 + r} \right)^5. \]

Calculator solution: Input 0, 2.01, 2.31, 2.66, 3.06, 56.32 (3.52 + 52.80) into the cash flow register, input I = 12, PV = ? PV = $39.43.
c. First Year
\[
\frac{D_1}{P_0} = \frac{2.01}{39.42} = 5.10\%
\]
Capital gains yield = 6.90*
Expected total return = 12.00%

Sixth Year
\[
\frac{D_6}{P_5} = \frac{3.70}{52.80} = 7.00\%
\]
Capital gains yield = 5.00
Expected total return = 12.00%

*We know that \( r \) is 12 percent, and the dividend yield is 5.10 percent; therefore, the capital gains yield must be 6.90 percent.

The main points to note here are as follows:

1. The total yield is always 12 percent (except for rounding errors).

2. The capital gains yield starts relatively high, then declines as the supernormal growth period approaches its end. The dividend yield rises.

3. After \( t=5 \), the stock will grow at a 5 percent rate. The dividend yield will equal 7 percent, the capital gains yield will equal 5 percent, and the total return will be 12 percent.