Sample problem for final #2

PLQ, Inc. stock is currently priced at $420 per share. It pays a $25 dividend to shareholders of record in six months. Use the following discount rate information for 3, 6, 9 and 12 months to answer the following questions:

\[
B(0,3) = 0.99 \\
B(0,6) = 0.98 \\
B(0,9) = 0.97 \\
B(0,12) = 0.96
\]

a) what is the 3-month forward price for PLQ stock?

If \( B(0,3 \text{ months}) = 0.99 \), then $1 grows to $1.0101 in three months.

\[
F = \text{Spot} \times FV(\$1) = S \times (1.0101) = 420 \times (1.0101) = 424.24
\]

b) what is the 9-month forward price for PLQ stock?

\[
F = \text{Spot} \times FV(\$1) - FV(\text{divs paid prior to maturity})
\]

If \( B(0,9 \text{ months}) = 0.97 \), then $1 grows to $1.031 in nine months. If we ignore the interest earned on the dividend from months 6 to 9, then the forward price is:

\[
F = 420 \times (1.031) - 25 = 433.02 - 25 = 408.02
\]

*The rest is only if you really really care (like when you take a class from someone picky):*

If we incorporate the interest earned on the dividend for months 7, 8 & 9, we note that the six-month forward three month rate is \([B(0.6)/B(0.9)] - 1 = 1.03\%\).

\( \text{This is overkill, you could just use 1\%} \)

So the dividend of $25 would earn $25 \times (0.0103) = 0.2575 \text{ interest, call it 0.26 interest, so the forward price should be 0.26 lower:} 

\[
F = 420 \times (1.031) - 25.26 = 407.76
\]

c) if the 3-month forward price of PLQ was $440, how could you lock in a riskless profit? Be specific in your explanation!

<table>
<thead>
<tr>
<th>Position</th>
<th>Cash flow now</th>
<th>Cash flow at T=3 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sell Forward</td>
<td>0</td>
<td>-[ S(T) – 440 ]</td>
</tr>
<tr>
<td>Buy stock</td>
<td>-420</td>
<td>S(T)</td>
</tr>
<tr>
<td>Borrow 420</td>
<td>+420</td>
<td>424.24</td>
</tr>
<tr>
<td>Net</td>
<td>0</td>
<td>440 – 424.24 = $15.76</td>
</tr>
</tbody>
</table>