**QUIT 2 SOLUTIONS**

1. \( p = 2.50 \) \( y = 1\% \) PER MONTH
   
   \[ S_0 = 46.5 \]
   
   \[ E = 50 \]
   
   LOWER BOUND
   
   \[ p \geq \frac{E}{e^{rt}} - S_0 \]
   
   or \( p \geq \frac{50}{1.01} - 46.5 \rightarrow p \geq 2.00 \)

   **BUT** \( p = 2.5 \) CHEAPER

   **BORROW**
   
   49 TO
   
   - BUY PUT
   
   - BUY STOCK

   \[ \text{IN 1 MONTH MUST RETURN} \]

   \[ 49 (1.01) = 49.49 \]

   **AT EXPIRATION**

   IF \( ST < 50 \) \( SELL \) STICK AT 50 \( \rightarrow 49.49 = 0.51 \)

   IF \( ST > 50 \) \( SELL \) STICK AT 52 \( \rightarrow 49.49 = 2.51 \)

   (SAY 52)

2. **PUT-CALL PARITY**

   \[ p + S_0 = c + \frac{E}{e^{rt}} \]

   \[ 3 + 19 ? 3 + \frac{50}{1.015} \]

   \[ 22 ? 22.40 \]
2. **Put-Call Parity**

\[ P + S_0 = C + \frac{E}{1 + r} \]

\[ P + S_0 = 3 + 19 = 22 \]

\[ C + \frac{E}{1 + r} = 3 + \frac{20}{1.015} = 22.70 \]

Buy put  
Drown 22 
Buy stock 
Sell call  
Plus 3

\[ \text{If } S_T > 20 \text{ sell stock at 20} \]
\[ \text{If } S_T \leq 20 \text{ sell stock at 20} \]

3. **Strangle**

<table>
<thead>
<tr>
<th>( S_T )</th>
<th>Payoff from Call</th>
<th>Payoff from Put</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S_T \leq E_1 )</td>
<td>0</td>
<td>( E_1 - S_T )</td>
<td>( E_1 - S_T )</td>
</tr>
<tr>
<td>( E_1 &lt; S_T \leq E_2 )</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( S_T &gt; E_2 )</td>
<td>( S_T - E_2 )</td>
<td>0</td>
<td>( S_T - E_2 )</td>
</tr>
</tbody>
</table>

**Payoff**

\[ \text{Stock Price} \]

\[ E_1 \]

\[ E_2 \]
4. Stock Price  
   Exercise Price  
   Volatility  
   \[ \uparrow \quad \uparrow \quad \uparrow \quad \uparrow \quad \uparrow \quad \uparrow \]

5. Lower stock price will increase the price of the put. Therefore B.

6. Buy put with exercise price \( E_1 \)  
   Sell put with exercise price \( E_2 \)

\[
\begin{array}{c|c|c|c}
\text{ST} & \text{Payoff from Long Put (E1)} & \text{Payoff from Short Put (E2)} & \text{Total} \\
\hline
\text{ST < E1} & \text{E1 - ST} & \text{ST - E2} & \text{E1 - E2} \\
\text{E1 < ST < E2} & 0 & \text{ST - E2} & \text{ST - E2} \\
\text{ST > E2} & 0 & 0 & 0 \\
\end{array}
\]

Payoff diagram
7. USING CALLS \( E_1 \quad E_2 \quad E_3 \)
BUY 1 SELL 2 BUY 1
\[ E_2 = \frac{E_1 + E_3}{2} \]

USING PUTS \( E_1 \quad E_2 \quad E_3 \)
BUY 1 SELL 2 BUY 1
\[ E_2 = \frac{E_1 + E_3}{2} \]

<table>
<thead>
<tr>
<th>TABLE USING CALLS</th>
<th>PAYOFF</th>
<th>PAYOFF</th>
<th>PAYOFF</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST ≤ E_1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E_1 &lt; ST ≤ E_2</td>
<td>0</td>
<td>0</td>
<td>-2(ST-E_2)</td>
<td>E_2 - ST</td>
</tr>
<tr>
<td>E_2 &lt; ST ≤ E_3</td>
<td>0</td>
<td>-2(ST-E_2)</td>
<td>E_3 - ST</td>
<td></td>
</tr>
<tr>
<td>ST &gt; E_3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE USING PUTS</th>
<th>PAYOFF</th>
<th>PAYOFF</th>
<th>PAYOFF</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST ≤ E_1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E_1 &lt; ST ≤ E_2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E_2 &lt; ST ≤ E_3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ST &gt; E_3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
8. \[ \begin{array}{c}
\text{buy 1} \\
\text{sell 2} \\
\text{buy 1}
\end{array} \]

\[ p_1 = 21 \quad p_2 = 68 \quad p_3 = 115 \]

See Question 7

9. \[ p + 50 = c + \frac{e}{1 + r} \]

\[ p + E = c + \frac{e}{1 + r} \rightarrow c - p = E - \frac{e}{1 + r} > 0 \]

10. \( S \sim N(50, 10) \)

\( E = 60 \)

\[ P(S < 60) = P\left( z < \frac{60 - 50}{10} \right) = P\left( z < 1 \right) = 0.8413. \]