Exercise 1:
The call option will be exercised if $S_1 > 50$. The seller of the call will make profit if $E - S_1 + C > 0$, or $50 - S_1 + 4 > 0 \Rightarrow S_1 < 54$. 

![Profit from selling a call: C=4, E=50](image)

Exercise 2:
The put option will be exercised if $S_1 < 40$. The holder of the put will make profit if $E - S_1 - P > 0$ or $40 - S_1 - 3 > 0 \Rightarrow S_1 < 37$. 

![Profit from buying a put: P=3, E=40](image)

Exercise 3:
Let $S_1$ be the stock price at expiration.

a. Then the 2 puts will be exercised if $S_1 < 50$. Therefore for the 2 puts the profit is: $2(50 - S_1) - 12 = 88 - 2S_1$. If $S_1 \geq 50$ then the profit is -12.

b. The call will be exercised if $S_1 > 50$. Therefore for the call the profit is: $(S_1 - 50) - 5 = S_1 - 55$. If $S_1 \leq 50$ then the profit is -5.

c. The 2 puts will be exercised if $S_1 < 50$, while the call will be exercised if $S_1 > 50$. Therefore for the 2 puts the profit is: $2(50 - S_1) - 17 = 83 - 2S_1$. For the call the profit is: $(S_1 - 50) - 17 = S_1 - 67$. 
Exercise 4:
Profit from writing the two calls: If $S_1 \leq 45$ the profit is 10. If $S_1 > 50$ the profit is $10 - 2(S_1 - 45) = 100 - 2S_1$.
Profit from buying one call: If $S_1 \leq 40$ the profit is -8. If $S_1 > 40$ the profit is $S_1 - 40 - 8 = S_1 - 48$.

Exercise 6:
The table that shows the payoffs for each position:

<table>
<thead>
<tr>
<th>$S_T$</th>
<th>Payoff from long call</th>
<th>Payoff from short call</th>
<th>Payoff from long put</th>
<th>Payoff from short put</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_T &gt; E_2$</td>
<td>$S_T - E_1$</td>
<td>$E_2 - S_T$</td>
<td>0</td>
<td>0</td>
<td>$E_2 - E_1$</td>
</tr>
<tr>
<td>$E_1 &lt; S_T &lt; E_2$</td>
<td>$S_T - E_1$</td>
<td>0</td>
<td>$E_2 - S_T$</td>
<td>0</td>
<td>$E_2 - E_1$</td>
</tr>
<tr>
<td>$S_T &lt; E_1$</td>
<td>0</td>
<td>0</td>
<td>$E_2 - S_T$</td>
<td>$S_T - E_1$</td>
<td>$E_2 - E_1$</td>
</tr>
</tbody>
</table>