There are 3 versions of this quiz.
1. The stock of Thomas Corporation sells for 124 today.

   The annual effective risk free interest rate is 8%.

   The premium for a 6 month European style call on Thomas Corporation stock with a strike price of 124 is 11.12.

   The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 124 is 6.44.

   If you purchase a floor on Thomas Corporation, determine the maximum loss (largest negative profit) that you could experience.

Solution:

A floor is when you buy a stock and buy a put.

There are number of ways to attack these problems. If you know the graph, you know that the minimum profit is for low prices to do a payoff and profit table for zero to find the minimum profit.

Spot = 0

Payoff on stock = spot at end = 0

Payoff on Put is Strike minus Spot at end = 124 - 0 = 124

Total Payoff = 124

Cost of Stock = 124 and cost of put = 6.44. Total cost = 130.44.

FV of Cost = (130.44)(1.08^{0.5})=135.56

Profit = Payoff – FV of Cost = 124 - 135.56 = - 11.56

Another way to do it is to remember that the profit on a floor is the same as the profit on a call. The smallest profit on a call is when the payoff is zero and then the profit = payoff – FV of Cost = 0 – (11.12)( 1.08^{0.5})= - 11.56

Finally, you can just create a table with some high values and low values and figure out where the smallest profit is.
2. The stock of Thomas Corporation sells for 124 today.

The annual effective risk free interest rate is 8%.

The premium for a 6 month European style call on Thomas Corporation stock with a strike price of 125 is 10.60.

The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 125 is 6.88.

If you purchase the stock of Thomas Corporation, complete the following payoff and profit table. (Show your work if you want full credit.)

**Solution:**

<table>
<thead>
<tr>
<th>Spot Price at end of 6 months.</th>
<th>Payoff</th>
<th>Future Value of Cost</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>Payoff = Spot at Expiry = 110</td>
<td>Cost is Spot at time zero = 124</td>
<td>Profit = Payoff – FV Cost = - 18.86</td>
</tr>
<tr>
<td>120</td>
<td>120</td>
<td>128.86</td>
<td>- 8.86</td>
</tr>
<tr>
<td>130</td>
<td>130</td>
<td>128.86</td>
<td>1.14</td>
</tr>
<tr>
<td>140</td>
<td>140</td>
<td>128.86</td>
<td>11.14</td>
</tr>
<tr>
<td>150</td>
<td>150</td>
<td>128.86</td>
<td>21.14</td>
</tr>
</tbody>
</table>
3. The stock of Thomas Corporation sells for 124 today.

The annual effective risk free interest rate is 8%.

The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 130 is 9.00.

Calculate the premium for a 6 month European style call on Thomas Corporation with a strike price of 130.

**Solution:**

Use the Put Call Parity formula

\[
C - P = S_0 - \frac{K}{(1+i)} \implies C = 9 + 124 - \frac{130}{(1.08)^{0.5}} \implies C = 7.91
\]
1. The stock of Thomas Corporation sells for 124 today.

The annual effective risk free interest rate is 8%.

The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 130 is 9.15.

Calculate the premium for a 6 month European style call on Thomas Corporation with a strike price of 130.

Solution:

Use the Put Call Parity formula

\[ C - P = S_0 - \frac{K}{(1+i)^{t}} \implies C - 9.15 = 124 - \frac{130}{(1.08)^{0.5}} \implies C = 8.06 \]
2. The stock of Thomas Corporation sells for 124 today.

The annual effective risk free interest rate is 8%.

The premium for a 6 month European style call on Thomas Corporation stock with a strike price of 124 is 11.12.

The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 124 is 6.44.

If you purchase a cap on Thomas Corporation, determine the maximum loss (largest negative profit) that you could experience.

**Solution:**

A cap is when you sell a stock and buy a call.

There are number of ways to attack these problems. If you know the graph, you know that the minimum profit is for high prices so do a payoff and profit table for 500 to find the minimum profit.

Spot = 500

Payoff on stock = - spot at end = - 500

Payoff on Call is Spot at end - Strike = 500 – 124 = 376

Total Payoff = - 124


FV of Cost = (- 112.88)(1.08^{0.5})= - 117.31

Profit = Payoff – FV of Cost = - 124.00 – (- 117.31) = - 6.69

Another way to do it is to remember that the profit on a cap is the same as the profit on a put. The smallest profit on a call is when the payoff is zero and then the profit = payoff – FV of Cost = 0 – (6.44)( 1.08^{0.5})= - 6.69

Finally, you can just create a table with some high values and low values and figure out where the smallest profit is.
3. The stock of Thomas Corporation sells for 124 today.

The annual effective risk free interest rate is 8%.

The premium for a 6 month European style call on Thomas Corporation stock with a strike price of 125 is 10.60.

The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 125 is 6.88.

If you purchase a put on Thomas Corporation, complete the following payoff and profit table. (Show your work if you want full credit.)

<table>
<thead>
<tr>
<th>Spot Price at end of 6 months.</th>
<th>Payoff</th>
<th>Future Value of Cost</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max (0, Strike – Spot)</td>
<td>Cost = 6.88</td>
<td>Payoff – FV of Cost</td>
</tr>
<tr>
<td>110</td>
<td>Max(0, 110 – 125) = 15</td>
<td>FV of Cost = 6.88(1.08^2) = 7.15</td>
<td>= 15 – 7.15 = 7.85</td>
</tr>
<tr>
<td>120</td>
<td>5</td>
<td>7.15</td>
<td>- 2.15</td>
</tr>
<tr>
<td>130</td>
<td>0</td>
<td>7.15</td>
<td>- 7.15</td>
</tr>
<tr>
<td>140</td>
<td>0</td>
<td>7.15</td>
<td>- 7.15</td>
</tr>
<tr>
<td>150</td>
<td>0</td>
<td>7.15</td>
<td>- 7.15</td>
</tr>
</tbody>
</table>
MATH 373  
Spring 2016  
Quiz 6  
April 21, 2016

1. The stock of Thomas Corporation sells for 124 today.

   The annual effective risk free interest rate is 8%.

   The premium for a 6 month European style call on Thomas Corporation stock with a strike price of 125 is 10.60.

   The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 125 is 6.88.

   If you purchase a call on Thomas Corporation, complete the following payoff and profit table. (Show your work if you want full credit.)

<table>
<thead>
<tr>
<th>Spot Price at end of 6 months.</th>
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<th>Future Value of Cost</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>Max (0, Spot – Strike)</td>
<td>Cost = 10.60</td>
<td>Payoff – FV of Cost</td>
</tr>
<tr>
<td></td>
<td>Max(0, 110 – 125) = 0</td>
<td>FV of Cost = 10.60(1.08^2) = 11.02</td>
<td>= 0 – 7.15 = -11.02</td>
</tr>
<tr>
<td>120</td>
<td>0</td>
<td>11.02</td>
<td>-11.02</td>
</tr>
<tr>
<td>130</td>
<td>5</td>
<td>11.02</td>
<td>-6.02</td>
</tr>
<tr>
<td>140</td>
<td>15</td>
<td>11.02</td>
<td>3.98</td>
</tr>
<tr>
<td>150</td>
<td>25</td>
<td>11.02</td>
<td>13.98</td>
</tr>
</tbody>
</table>
2. The stock of Thomas Corporation sells for 124 today.

The annual effective risk free interest rate is 8%.

The premium for a 6 month European style call on Thomas Corporation stock with a strike price of 130 is 8.25.

Calculate the premium for a 6 month European style put on Thomas Corporation with a strike price of 130.

**Solution:**

Use the Put Call Parity formula

\[ C - P = S_0 - \frac{K}{(1+i)^{1/2}} \Rightarrow 8.25 - P = 124 - \frac{130}{(1.08)^{0.5}} \Rightarrow C = 9.34 \]
3. The stock of Thomas Corporation sells for 124 today.

   The annual effective risk free interest rate is 8%.

   The premium for a 6 month European style call on Thomas Corporation stock with a strike price of 124 is 11.12.

   The premium for a 6 month European style put on Thomas Corporation stock with a strike price of 124 is 6.44.

   If you purchase a straddle on Thomas Corporation, determine the maximum loss (largest negative profit) that you could experience.

   **Solution:**

   A straddle is the purchase of a call and a put with the strike price equal to the current spot price. The maximum loss is when the stock price does not change. Then the payoff on both the put and call are zero so the profit = 0 – FV of cost.

   Cost = 11.12 + 6.44 = 17.56

   FV of Cost = (17.56)(1.08^{0.5}) = 18.25

   Minimum profit = 0 – 18.25 = -18.25