1. The continuously compounded annual interest rate $r$ is 0.04. Investor A buys the index at time 0 and sells a 1025 strike call with $T = 0.25$. Investor B writes a 1025 strike put and lends $x$. The two investors have the same payoff functions. What is $x$?
   a) 1000
   b) 1007.40
   c) 1014.80
   d) 1025
   e) 1037.40
   Work shown (4 points):

2. You are a producer of gold, and have expenses of 800 per ounce of gold produced. Assume that the cost of all other production-related expenses is negligible, and that you will be able to sell all gold produced at the market price. In 1 year, the market price of gold will be 1 of 3 possible prices, corresponding to the following probability table:

<table>
<thead>
<tr>
<th>Gold Price per ounce in 1-year</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>750</td>
<td>0.2</td>
</tr>
<tr>
<td>850</td>
<td>0.5</td>
</tr>
<tr>
<td>950</td>
<td>0.3</td>
</tr>
</tbody>
</table>

You hedge the price of gold by buying a 1-year put option with an exercise price of 900 per ounce. The option costs 100 per ounce now, and the continuously compounded interest rate is 6%. Which of the following is closest to your expected 1-year profit per ounce of gold produced?
   a) 0
   b) 3
   c) 6
   d) 9
   e) 12
   Work shown (4 points):
1. The continuously compounded annual interest rate \( r \) is 0.04. Investor A buys the index at time 0 and sells a 1025 strike call with \( T = 0.25 \). Investor B writes a 1025 strike put and lends \( x \). The two investors have the same payoff functions. What is \( x \)?
   a) 1000
   b) 1007.40
   c) 1014.80
   d) 1025
   e) 1037.40

   Work shown (4 points):
   Buying the index and selling a call creates a covered call.
   Same payoff function if one write a put for the same exercise price \( K \) and lend the present value of \( K \).
   \[
   \text{Payoff of a covered call} = S_T - \max(0, S_T - K) = S_T - \max(0, S_T - 1025)
   \]
   \[
   \text{Payoff of a written put and lending} = K - \max(0, K - S_T) = K - \max(0, 1025 - S_T)
   \]
   \[
   S_T \cdot \max(0, S_T - 1025) = K \cdot \max(0, 1025 - S_T)
   \]
   \[
   \rightarrow \text{The amount loaned here} \ x = Ke^{-rT} = 1025e^{-0.04 \cdot 0.25} = 1014.80
   \]
   Answer is C

2. You are a producer of gold, and have expenses of 800 per ounce of gold produced. Assume that the cost of all other production-related expenses is negligible, and that you will be able to sell all gold produced at the market price. In 1 year, the market price of gold will be 1 of 3 possible prices, corresponding to the following probability table:

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   \begin{array}{c|c}
   \text{Gold Price per ounce in 1-year} & \text{Probability} \\
   \hline
   750 & 0.2 \\
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   \end{array}
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   You hedge the price of gold by buying a 1-year put option with an exercise price of 900 per ounce. The option costs 100 per ounce now, and the continuously compounded interest rate is 6%. Which of the following is closest to your expected 1-year profit per ounce of gold produced?
   a) 0
   b) 3
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   e) 12

   Work shown (4 points):
   The cost of the put option is \( 100e^{0.06(1)} = 106.18 \).
   The table below shows the put payoff and profit before option cost for each market price.

   \[
   \begin{array}{c|c|c|c}
   \text{Gold Market Price per ounce in 1-year} & 750 & 850 & 950 \\
   \hline
   \text{Probability} & 0.2 & 0.5 & 0.3 \\
   \text{Put payoff} = \max(0, 900 - S_T) & 150 & 50 & 0 \\
   \text{Gold Expense} & 800 & 800 & 800 \\
   \text{Profit before Option premium cost} = S_T + \max(0, 900 - S_T) - \text{Expense} & 100 & 100 & 150 \\
   \end{array}
   \]

   Expected Profit before option cost = 100(0.2) + 100(0.5) + 150(0.3) = 115
   Expected Profit = 115 - 106.18 = 8.82
   Answer is D
Future plans

In addition to these paper-and-pencil quizzes, put Practice exams 1 and 2 into WebCT respondus for online quiz. The paper-and-pencil version will be practice for the paper-and-pencil SOA exam while the WebCT quiz will be practice for SOA FM/2 online exam.