QUIZ ONE

1) Greg C places the option trades given below, where each option is on stock APT and has time-to-expiry 3 months.

- Buy one call with $55 strike and premium $5
- Sell two calls with $60 strike and premium $3
- Buy one call with $65 strike and premium $2

\[ \begin{align*}
1 \text{ share} \times \$5 &= \$5 & \text{Total premium} = \$6 - \$5 - \$2 \\
2 \text{ shares} \times \$3 &= \$6 \\
1 \text{ share} \times \$2 &= \$2 \\
\end{align*} \]

a) Carefully draw the profit diagram for this set of trades, showing all strike prices (5pts)

\[ \text{Profit} \]

\[ \begin{align*}
\text{buy one call @ } K = 55 \\
\text{buy one call @ } K = 65 \\
\text{sell two calls @ } K = 60 \\
\end{align*} \]

b) What is the maximum profit for this set of trades? (1pt)

Under what condition(s) does this occur? (1pt)

\[ \begin{align*}
\text{when } S_t = 60, \quad \text{Profit} &= S_t - K_1 - 1 = 60 - 55 - 1 = \$4 / \text{share} \\
\text{Total Profit} &= \$4 / \text{share} \times 100 \text{ shares} = \$400 \\
\end{align*} \]

c) What is the maximum loss for this set of trades? (1pt)

Under what condition(s) does this occur? (1pt)

\[ \begin{align*}
\text{Max loss} &= -\$1 / \text{share} \\
\text{Total Max loss} &= -\$1 / \text{share} \times 100 \text{ shares} = \$100 \\
\end{align*} \]

d) What is the name of this strategy? (1pt)

\[ \text{Long butterfly spread} \]
2. You own a company that delivers large quantities of widgets to customers. You are expecting that at the end of the year, you will have a need for 8,000 pounds of widgets. If prices of widgets rise, you will not be able to pass the extra cost to your customers, so you are worried. But then you remember from PSTAT 170 that futures are a great way to hedge such a risk. There aren’t futures on widgets, but there ARE futures on gadgets. The size of a gadget futures contract is 22,000 lbs. The recent price changes are shown in the table below. Using this information, write down the optimal hedge (direction and size). Show all calculations and relevant formulas. (6pts)

<table>
<thead>
<tr>
<th>Period</th>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>-2</td>
<td>-2.2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

\[
Q_A = 8,000 \quad Q_F = 22,000
\]

\[
N^* = \frac{h^* Q_A}{Q_F} = \frac{0.977 (8,000)}{22,000} = 0.355
\]

Thus, the company should long 1 future contract.

\[
h^* = \rho \frac{\sigma_s}{\sigma_F}
\]

\[
\frac{\sum x_i y_i}{n} = 2 \quad \frac{\sum y_i}{n} = 4.7
\]

\[
\frac{\sum x_i^2}{n} = 34 \quad \frac{\sum y_i^2}{n} = 35.05
\]

\[
\frac{\sum x_i y_i}{n} = 31.8
\]

\[
\sigma_s = \sqrt{\frac{n \sum x_i^2 - (\sum x_i)^2}{n(n-1)}} = \sqrt{\frac{34}{4} - \frac{2^2}{5 \times 4}}
\]

\[
= 2.880972
\]

\[
\sigma_F = \sqrt{\frac{n \sum y_i^2 - (\sum y_i)^2}{n(n-1)}} = \sqrt{\frac{35.05}{4} - \frac{4.7^2}{5 \times 4}}
\]

\[
= 2.767309
\]

\[
\rho = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{[n \sum x_i^2 - (\sum x_i)^2] [n \sum y_i^2 - (\sum y_i)^2]}}
\]

\[
= 0.93822
\]

\[
\Rightarrow h^* = \rho \frac{\sigma_s}{\sigma_F} = 0.93822 \times \frac{2.880972}{2.767309} = 0.977.
\]
3. Which of the following creates a bear spread? (Circle all that apply) (2pts)

a) Long a put with higher strike, short a put with lower strike; both options have same expiry
b) Long a put with lower strike, short a put with higher strike; both options have same expiry
c) Long a call with higher strike, short a call with lower strike; both options have same expiry
d) Long a call with lower strike, short a call with higher strike; both options have same expiry

4. Which is the most sensible reason for doing a covered call? (2pts)

a) You are very bullish on the stock
b) You are very bearish on the stock
c) You believe the stock will go nowhere
d) You are expecting a large move when company earnings are announced, but are unsure of the direction

Tell me a joke (keep it clean)