1. (25%) The premium for a one-year off-market forward contract with a forward price of $200 is $18.18. The premium for a 200-strike one-year European call is $32.98 and for a 200-strike one-year European put is \( X \). The risk-free rate of interest is 10% effective per annum. Determine \( X \).

(A) $2.98  (B) $3.45  (C) $14.80  (D) $16.28  (E) $18.10

\[
\text{forward} = \text{prem (long call)} - \text{prem (short put)}
\]

\[
18.18 = 32.98 - X
\]

\[
X = 14.80
\]

2. (25%) The spot price of a share of XYZ corp stock is $100. The premium for a 12-month European put option with an exercise of $100 is $2.50. The effective rate is 10%. Find the price of a 12-month European call option with a strike price of $100 on XYZ corp stock.

(A) $2.50  (B) $4.75  (C) $8.47  (D) $11.59  (E) $12.50

\[
C = S_o - PV(k)
\]

\[
C = S_o - PV(k) = 2.5 + 100 - 100 \cdot 1.10^{-1} = 11.59
\]

Your answers: (Leave blank if you need no grading)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>D</td>
<td>C</td>
<td>B</td>
</tr>
</tbody>
</table>
3. (25%) You buy a call with an exercise price of $90 for a premium of $10, and you sell a call with an exercise price of $105 for a premium of $3. Both options have 9-month maturities. The nominal annual interest rate is 8% convertible quarterly. What is the maximum possible profit produced by this position?

(A) $4.34    (B) $7.43    (C) $7.57    (D) $8    (E) $15

Profit from premium \frac{\text{payoff}}{*}
\begin{align*}
\text{when } & S_t > 105 \\
\max & = 15 - 7 \cdot 1.02^3 - 7.57
\end{align*}

4. (25%) You buy a call with an exercise price of $90 for a premium of $10, and you sell a call with an exercise price of $105 for a premium of $3. Both options have 9-month maturities. The nominal annual interest rate is 8% convertible quarterly. What is the price of the stock such that you would break even on your position, as of the expiration date?

(A) $94.34    (B) $97.43    (C) $97.57    (D) $98    (E) $99

\begin{align*}
(X-90) - (10-3) \cdot (1+\frac{8\%}{4})^3 &= 0 \\
(7.43) &< 15
\end{align*}

\begin{align*}
X &\text{ must be } (90, 105) \\
X &= 97.43
\end{align*}