1. (25%) Aleshia enters into a long forward contract. If the spot price at expiration were $S$, her payoff would be -$10$. If the spot price at expiration were 20% higher, her payoff would be $8$. Determine $S$.

(A) $10$  
(B) $40$  
(C) $70$  
(D) $90$  
(E) $100$

\[ S - F = 10 \]
\[ 1.2S - F = 8 \]

\[ S = 90 \]

2. (25%) You are given the following information:
Spot price of market index today = $1500$
Forward price of nine-month forward contract on market index = $1540$
Spot price of market index nine months from today = $1520$
The annual nominal interest rate is 6% convertible monthly
Find the difference, nine months from today, between the profits associated with a long index strategy versus a long forward strategy.

(A) $0$  
(B) $5$  
(C) $9$  
(D) $20$  
(E) $29$

Long index: \[ 1520 - 1500 \cdot (1 + \frac{6\%}{12})^9 = -48.8 \]
Long forward: \[ 1520 - 1540 = -20 \]

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

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3. (25%) Joe buys a 3-month European call for a premium of $5.03. At a spot price at expiration of $78, Joe's profit is $2.11. The risk-free interest rate is 6% compounded quarterly. The strike price of the call is X. Determine X.

(A) $69.89  (B) $75.00  (C) $78.00  (D) $80.11  (E) $85.22

Cost of option:

\[ 5.03 \times (1 + \frac{6\%}{4}) = 5.10545 \]

Total profit: $2.11

Gain from exercise: $2.99545

\[ 78 - X \]

\[ X = 73.00455 \]

4. (25%) Kathy writes a one-year European call option with a strike price of X and a premium of $11.66. Kathy's profit at expiration is 0 at a spot price of $97.13. The risk-free interest rate is 4% effective. Determine X.

(A) $85.00  (B) $85.47  (C) $97.13  (D) $108.79  (E) $109.26

\[- (97.13 - X) + 11.66 \times 1.04 = 0\]

Loss from exercise

Accumulated gain from premium