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Part I. Multiple Choice Questions (36%, 4% each)

1. (4%) In response to the high inflation rate, the Fed has raised the federal fund rate by 425 basis points in 2022. Bank of Alpha also increases the interest rate of its saving account to an APR of 4.04% which is compounded semiannually. If an investor put $10,000 into the saving account of Bank of Alpha, how much can the investor obtain from the saving account after six months?
(A) $10,000
(B) $10,404
(C) $10,200
(D) $10,202
(E) None of the above

2. (4%) Comparing two otherwise equal firms, the beta of the common stock of an unlevered firm is ______ than the beta of the common stock of a levered firm when the corporate tax is absent.
(A) equal to
(B) significantly greater
(C) slightly greater
(D) less
(E) None of the above

3. (4%) Kenneth holds 10 shares of The Dan Inc. stock. Currently, there are 1,000 shares of The Dan Inc. outstanding at $20 per share. The Dan Inc. will issue additional 200 shares at $32 per share. The existing shareholders have a priority to buy new shares corresponding to their original ownership at $32 per share. Kenneth will ______ new shares if he cares about the gain/loss of his investment; and will ______ new shares if he cares about the dilution of his ownership of The Dan Inc.
(A) buy; not buy
(B) buy; buy
(C) not buy; buy
(D) not buy, not buy
(E) None of the above

備 註	作答於試題上者，不予計分。 試題請隨卷繳交。

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4. (4%) Based on the previous question, if The Dan Inc. finds the market reaction to the SEO is not good. The Dan Inc., therefore, decides to lower the offering price to $8 per share. Kenneth will _____ new shares if he cares about gain/loss of his investment; and will _____ new shares if he cares about the dilution of his ownership of The Dan Inc.
   (A) buy; not buy
   (B) buy; buy
   (C) not buy; buy
   (D) not buy, not buy
   (E) None of the above

5. (4%) The divisor of a price-weighted index will be adjusted lower if
   I. a low-price stock is included in the index instead of a high-price stock.
   II. cash dividends are paid by one of the component stocks.
   III. one of the component stocks experiences a stock split.
   (A) I only
   (B) I and II
   (C) I and III
   (D) II and III
   (E) I, II, and III

6. (4%) A stock has an 7% of excess return. The beta of the security is 1.2, and the market excess return is 6%. If the risk-free rate is 2%, the stock is _____ and will be plotted _____.
   (A) overpriced; above the security market line
   (B) overpriced; below the security market line
   (C) underpriced; above the security market line
   (D) underpriced; below the security market line
   (E) underpriced; either above or below the security market line depending on its covariance with the market

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7. (4%) In 2021, WSH Balanced Fund earned a higher rate of return than its benchmark portfolio did. The weights and performance of each asset class for WSH Balanced Fund and its benchmark portfolio are in the following.

	WSH Balanced Fund		Benchmark Portfolio	
	Weight	Rate of Return	Weight	Rate of Return
Bonds	20%	3%	40%	5%
Stocks	80%	18%	60%	15%

The contribution of asset allocation across markets to the total excess return was
(A) 0%
(B) 1%
(C) 2%
(D) 3%
(E) 4%

8. (4%) CMC Corporation announced a new product yesterday, and the stock price of CMC Corporation experienced a rate of return of 5%. The market index also increased by 5% yesterday. If the market is efficient, this implies that
(A) the market treated CMC's announcement as good news.
(B) the market treated CMC's announcement as bad news.
(C) the market was neutral about CMC's announcement.
(D) we cannot determine the market reaction to CMC's announcement unless the risk-free rate is given.
(E) None of the above.

9. (4%) Which one of the following portfolios is least possible to be on the efficient frontier?

Portfolio	Risk Premium	Standard Deviation
P1	9%	0.04
P2	5%	0.0049
P3	15%	0.16
P4	12%	0.0225

(A) P1
(B) P2
(C) P3
(D) P4
(E) None of the above

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Part II. Calculations and Essays (64%)

1. The insurance company, HHI, has an obligation which will pay \$201,000 three years from now. To meet the obligation, HHI applies the immunization technique to construct a portfolio with two zero-coupon bonds. Specifically, HHI holds 100 units of one-year zero-coupon bond with \$1,000 par value and 100 units of five-year zero-coupon bond with \$1,000 par value. Any cash flow obtained before the third year will be reinvested at the prevailing market interest rate. The current market interest rate is 5%. Please answer the following questions.

   (1) (4%) How long is the duration of the portfolio?

   (2) (4%) How much does HHI cost in constructing the portfolio?

   (3) (4%) If the market interest rate increases to 6% right after HHI constructed the portfolio, what is the holding period rate of return for the portfolio at the end of the third year?

2. Ted is a hedge fund manager managing a \$300 million portfolio with an alpha of 1% per month and a beta of 1.5. The S&P 500 index today is 2,000. Ted expects the market will fall within one month and wants to hedge the portfolio. There are two hedge strategies Ted can apply.

   Strategy 1: Ted is to sell all shares of the portfolio and put all of the proceeds into one-month T-bill which provides 0.5% monthly rate of return.

   Strategy 2: Ted keeps the existing portfolio and sells 900 S&P 500 futures contracts (the futures contract has a multiplier of \$250 and will mature in 30 days).

   (1) (2%) Please show the alpha and the beta of Ted's holding if Ted chooses the first strategy.

   (2) (2%) Please show the alpha and the beta of Ted's holdings if Ted chooses the second strategy.

   (3) (6%) If the S&P 500 increases by 8% next month, please show the rate of return of the hedge fund for the second strategy.

備　　註	作答於試題上者，不予計分。 試題請隨卷繳交。

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3. Here are some financial records for Company NCCUC:
   Price per share = \$30
   Number of shares outstanding = 2,000,000 shares
   Profit margin = 25%
   Total debt = \$30,000,000
   Debt-to-equity ratio = 0.6
   Earnings per share = \$2
   Payout ratio = 40%
   Please calculate the followings.
   (1) (3%) Rate of return on equity
   (2) (3%) Retained earnings
   (3) (3%) Total asset turnover
   (4) (3%) Market-to-book ratio

4. Kathy is a mutual fund manager. Due to the covid-19 pandemic, the analyst report shows that ABC Corporation may not achieve the target earnings in the following two years, and therefore the stock of ABC Corporation will be underperformed in 2013. However, Kathy believes ABC Corporation is a good investment target in the long term. She decides to buy stock of ABC Corporation and apply a protective put strategy to avoid potential losses in the short term. Given the information on the stock and stock options for ABC Corporation below, please answer the following questions.

Underlying: ABC Corporation	Close Price
Stock	\$100.00
Call (X = \$100), T = 1 year	\$1.75
Call (X = \$120), T = 1 year	\$0.70
Put (X = \$100), T = 1 year	\$2.00
Put (X = \$80), T = 1 year	\$0.50

   (1) (4%) Please help Kathy to construct a protective put strategy.
   (2) (6%) Please show the rate of return for the strategy if the rate of return for stock price on the expiration date is 20%, 0%, and -20%.
   (3) (5%) Please plot the profits of the strategy when the stock price on the expiration date is between \$60 and \$140.

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5. Bill tries to construct a portfolio by Meta stock and Amazon stock. The expected rate of returns for Meta and Amazon are 12% and 8%, respectively. The standard deviations for Meta and Amazon are 0.4 and 0.2, respectively. The correlation between the returns of Meta and Amazon is 0.30. The 1-month T-bill yields a rate of 5%. Given the information on the two stocks, please answer the following questions.

(1) (4%) Bill wants to use Meta stock and Amazon stock to construct a portfolio with the highest Sharpe ratio. What are the expected return and standard deviation of the portfolio?

(2) (5%) The utility of Bill's investment can be calculated by $U = E(r) - \frac{1}{2}A\sigma^2$, where A is the degree of risk aversion. Please graphically show Bill's optimal choice.

(3) (6%) If Bill's degree of risk aversion is four ($A = 4$), what are the expected return and standard deviation of Bill's optimal choice?

備 註	作答於試題上者，不予計分。 試題請隨卷繳交。