FD Graded Quiz M3

Time left: 28:25

QUESTIONS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Question 1

Given the following sequence of prices for stock ABC: 145.50, 145.75, 146.00, 145.25, 146.25, 145.00, what is more likely the tick size (you are not allowed to go smaller than 1 cent)?

- 0.02
- 0.12
- 0.07
- (•) 0.25

Question 2

Given that portfolio variance $\sigma_p^2 = w^T \Sigma w$ and correlation ρ_{ij} affects Σ, what would happen to the efficient frontier when all pairwise correlations simultaneously increase by a fixed amount $\Delta\rho$ (assuming variances and returns remain unchanged)?

- The efficient frontier remains unchanged
- The efficient frontier maintains its shape but shifts upward
- The efficient frontier shifts right and becomes more compressed horizontally
- (•) The efficient frontier shifts left and becomes more dispersed

Question 3

According to Dahlquist, J. Knight, R. (2022) Principles of Finance, if you are given a portfolio with 15% return, beta of 1.4, market return of 10%, and risk-free rate of 2%, what would Jensen's alpha be?

- 2.4%
- (•) 1.8%
- 2.8%
- 3.2%

Question 4

According to Brownlees et al. "Financial econometric analysis at ultra-high frequency: Data handling concerns," which aggregation methods are appropriate for creating regular time bars from tick data?

- (•) First, Last, Maximum, Minimum for prices; Sum for volumes; Count for number of trades
- Linear interpolation for all types of data
- Previous point interpolation for all types of data
- Only averaging methods should be used for all types of data

Question 5

What is the key property of singular values in the Σ matrix?

- They are arranged in descending order and are non-negative real numbers
- They must sum to the matrix trace and can be complex numbers
- They can be negative or positive and are arranged randomly
- (•) They are always positive and arranged in ascending order

Question 6

For a 3×3 matrix, if $\sigma_1 = 7, \sigma_2 = 2, \sigma_3 = 1$,calculate the percentage of variance explained by first singular value

- (●) 90.74%
- ( ) 55.56%
- ( ) 75.00%
- ( ) 62.50%

Question 7

What is the key difference between dividend-adjusted returns and adjusted-close returns (assuming no splits or other corporate actions)?

- ( ) Adjusted-close returns only account for price changes
- (●) Adjusted-close returns assume dividend reinvestment while dividend-adjusted returns do not
- ( ) There is no difference between the two return calculations
- ( ) Dividend-adjusted returns include splits while adjusted-close returns do not

Question 8

Given daily percentage returns of 1%, -2%, and 3%, what is the cumulative logarithmic return over these periods?

- (●) ln(0.01) - ln(0.02) + ln(0.03)
- ( ) ln(1+0.01) + ln(1-0.02) + ln(1+0.03)
- ( ) 0.01 - 0.02 + 0.03
- ( ) Cannot be calculated due to negative return

Question 9

If a trade occurs at price 100 with volume 10 and is immediately followed by another trade at the same timestamp with price 102 and volume 5, what would be the VWAP for this split transaction?

- (●) 101.33
- ( ) 101
- ( ) 100.33
- ( ) 100.67

Question 10

If we observe that the dimension of $\text{span}(r_i)$ is less than n for n assets, and one asset can be perfectly replicated by a linear combination of others, what mathematical condition must exist in the covariance matrix Σ?

- (●) The covariance matrix must be singular (determinant = 0) due to linear dependence
- ( ) The covariance matrix must be positive definite
- ( ) The covariance matrix must be diagonal
- ( ) The covariance matrix must be symmetric positive definite

Question 11

According to Dahlquist, J. Knight, R. (2022) Principles of Finance beta interpretation, if a stock has a beta of 0.5, and the market declines by 12%, what would be the expected decline in the stock's price?

- ( ) 24%
- ( ) 3%
- (●) 6%
- ( ) 12%

Question 12

What is the primary reason tick data is considered the most granular form of market data?

- ○ It only includes opening and closing prices
- ○ It represents weekly market summaries
- ○ It only includes end-of-day prices
- ◉ It represents every single transaction that occurs on an exchange

Question 13

How would you design a compression algorithm using SVD?

- ○ Randomly select singular values to maintain data structure
- ◉ Keep only the k largest singular values and corresponding vectors based on desired accuracy
- ○ Keep only the smallest singular values as they represent fine details
- ○ Use only the U matrix for compression as it contains all necessary information

Question 14

If a matrix A has SVD A = UΣV^T, calculate (A^T A)V

- ○ UΣ^2
- ○ VΣ
- ○ UΣ
- ◉ VΣ^2

Question 15

According to Dahlquist, J. Knight, R. (2022) Principles of Finance, what is the key difference between the Sharpe ratio and the Treynor ratio?

- ○ Sharpe ratio is absolute while Treynor is relative
- ○ Sharpe ratio excludes the risk-free rate while Treynor includes it
- ○ Sharpe ratio uses market returns while Treynor uses portfolio returns
- ◉ Sharpe ratio uses total risk (standard deviation) while Treynor uses systematic risk (beta)

Question 16

An asset has a daily logarithmic return of 0.0008. What is its annualized logarithmic return assuming 252 trading days?

- ○ Annualized return = $(1 + 0.0008)^{252} - 1$
- ○ Annualized return = $e^{0.0008 \times 252} - 1$
- ◉ Annualized return = $0.0008 \times 252 = 0.2016$
- ○ Annualized return = $\frac{0.0008}{252} = 0.00000317$

SUBMIT