# PRACTICE QUESTIONS TO HELP YOU MASTER THE PART I FRM® EXAM

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# Top questions you must master to pass the Part I FRM® Exam

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**But first, here are some questions to test your knowledge of typical, fundamental topics that are likely to appear on the actual exam.**

1. ***The minimum variance frontier* most likely *consists of:***

   ***A. Individual assets only.***

   ***B. Portfolios only.***

   ***C. Individual assets and portfolios.***

   ***D. Only risk-free assets.***

Answer: B

Assets with low correlations can be combined into portfolios that have a lower risk than any of the individual assets in the portfolio. The minimum variance frontier consists of portfolios that minimize the level of risk for each level of expected return.

2. ***Compute her portfolio's standard deviation, if the correlation between the two assets equals 0.7.***

   ***A. 8.05%***

   ***B. 9.86%***

   ***C. 7.06%***

   ***D. 12.68%***

Answer: D

$[(0.3^2 \times 0.12^2) + (0.7^2 \times 0.0^2) + 2\ (0.3)\ (0.7)\ (0.12)\ (0.1414)\ (0.7)]^{0.5} = 12.68\%$

3. ***Use the following information to answer the next four questions:***

   ***The following information is available regarding the portfolio performance of three investment managers:***

| Manager | Return | Standard Deviation | Beta |
|---|---|---|---|
| A | 19% | 27% | 0.7 |
| B | 14% | 22% | 1.2 |
| C | 16% | 19% | 0.9 |
| Market (M) | 11% | 24% | |
| Risk-free rate | 5% | | |

***I. Manager B's expected return is* closest to:**

***A. 9.20%***

***B. 8.34%***

***C. 10.40%***

***D. 12.20%***

Answer: D

Expected return = $R_f + R\ (R_m - R_f)$

Expected return = $0.05 + 1.2\ (0.11 - 0.05) = 12.20\%$

***II. Manager A's Sharpe ratio is* closest to:**

***A. 0.51***

***B. 0.40***

***C. 0.20***

***D. 0.68***

Answer: A

Sharpe ratio = $(R_A - R_f) / R_A = (0.19 - 0.05) / 0.27 = 0.5185$

***III. Manager C's Treynor ratio is closest to:***

***A. 0.20***

***B. 0.25***

***C. 0.57***

***D. 0.12***

Answer: D

Treynor ratio = $(R_C - R_f) / R_C = (0.16 - 0.05) / 0.9 = 0.1222$

***IV. Manager C's Jensen's alpha is closest to:***

***A. 5.60%***

***B. 10.40%***

***C. 8.5%***

***D. 9.0%***

Answer: A

Manager C's expected return = $R_f + R\ (R_m - R_f) = 0.05 + 0.9\ (0.11 - 0.05) = 10.4\%$

Jensen's alpha = 16% − 10.4% = 5.6%

4. ***Darren Peters, FRM, has gathered information on all the monthly returns of actively managed portfolios and passive indices. He is using multifactor models, of which he has examined many. Darren determines the optimal number of factors using the R-squares for different models.***

   ***He selects a model that has a reasonable but small number of factors. He uses the difference in monthly returns between the managed portfolios and the market index represented by the S&P 500, represented as RTN, as the dependent variable. The independent variables are the S&P 500 return less the 90-day T-bill rate represented as MKT, the monthly returns to a passive portfolio of high EPS stocks less the returns of a passive portfolio of low EPS stocks represented by EPSS, and the monthly returns to a passive portfolio of small cap stocks less the returns of a passive portfolio of large cap stocks, represented by LCSC.***

   ***The following results were derived for the historical data:***

   ***RTN = –.0025 + .15MKT – .08EPSS – .07LCSC***

   ***Which of the following is not a reason to support the case for active portfolio management?***

   A. ***Failure of the CAPM beta to explain returns***

   B. ***Excess volatility in market prices***

   C. ***The existence of market anomalies***

   D. ***Efficient frontier theory***

Answer: D

All are valid reasons to support the case for active portfolio management except for the efficient frontier theory. The efficient frontier theory is the theory that all investors allocate their money between the risk-free asset and the tangency efficient portfolio.

5. ***Assume that you are concerned only with systematic risk. Which of the following would be the best measure to use to rank order funds with different betas based on their risk-return relationship with the market portfolio?***

   A. ***Treynor ratio***

   B. ***Sharpe ratio***

   C. ***Jensen's alpha***

   D. ***Sortino ratio***

Answer: A

Systematic risk is the risk that can't be diversified away and the beta of our portfolio is:

$\beta_P = (\rho_{PM} * \sigma_P * \sigma_M) / \sigma 2$ where $\rho_{PM}$ is the correlation coeffi cient between the portfolio and the market, $\sigma_p$ is the risk of the portfolio, and $\sigma_M$ is the risk of the market.

In either case, beta explains the volatility of the portfolio compared to the volatility of the market, which captures only systematic risk.The Sharpe ratio is standardized by sigma, not beta, so the Treynor ratio is the correct ratio to use in this case. The Treynor formula is $T_\rho = [E(R_\rho) - Rf] / \beta_\rho$, which describes the difference between excess return over systematic risk—the beta—which is what the question asks.

6. ***Ashley selected a sample of 20 stocks and calculated their mean return over a three-year period to be 4.25%. Given that the sample standard deviation is 0.3% and assuming that the population is normally distributed, the 90% confi dence interval is* closest to:**

   A. ***4.13% to 4.37%***

   B. ***4.22% to 4.44%***

   C. ***4.14% to 4.36%***

Answer: A

Since the population variance is not known, but the population is assumed to be normally distributed, and the sample size is small we must use the *t*-distribution.

Standard error = $0.3 / (20)^{0.5} = 0.06708$

Degrees of freedom = 20 − 1 = 19

For a 90% confi dence interval, we need 5% in either tail. The relevant *t*-score with 19 degrees of freedom is 1.7291.

Confidence interval
= 4.25% ± (1.7291 × 0.067%) = 4.13% to 4.37%

7. ***Alexis is conducting research on the stock market of an emerging economy. She believes that the mean daily return on the market's all-share index is statistically signifi cantly different from zero. She randomly selects 50 stocks that are traded on the country's stock exchange and calculates their average daily return to be 0.3%. The index that comprises all the shares in the country has a daily standard deviation of 0.2%. At the 5% level of signifi cance, Alexis would most likely:***

   A. ***Reject the null hypothesis, and conclude that the mean daily return is not statistically significantly different from zero.***

   B. ***Fail to reject the null hypothesis, and conclude that the mean daily return is not statistically significantly different from zero.***

   C. ***Reject the null hypothesis, and conclude that the mean daily return is statistically significantly different from zero.***

Answer: C

$H_0$: μ = 0; $H_a$: μ ≠ 0

Since the population (index comprising of all shares traded in the country) standard deviation is known, use the *z*-test.

This is a two-tailed test. At the 5% level of significance, the critical *z*-values for a two-tailed test are ± 1.96.

Test stat = $\{(0.003 - 0) / [(0.002) / (50)^{0.5}]\} = 10.607$

Since the test stat (10.607) is greater than the upper critical value (+1.96), the null hypothesis is rejected. Alexis would conclude that the mean daily return is statistically significantly different from zero.

***8. Use the following information to answer the next five questions:***

***An analyst regresses the bid/ask spread (dependent variable) for a sample of 1,900 stocks against the natural log of trading volume (independent variable). The results of the regression are provided below:***

| ANOVA | SS |
|---|---|
| Regression | 18.395 |
| Residual | 47.428 |

| | Coefficient | Standard Error | *t*-Statistic |
|---|---|---|---|
| Intercept | 0.62941 | 0.026635 | 23.63094 |
| Slope coefficient | −0.05248 | 0.002941 | −17.84427 |

***I. The coefficient of determination is* closest to:**

***A. 0.2795***

***B. 0.3879***

***C. 0.7205***

Answer: A

Coefficient of determination = Explained variation / Total variation Coefficient of determination = 18.395 / (18.395 + 47.428) = 0.2795

***II. The correlation coefficient (r) is* closest to:**

***A. 0.6228***

***B. −0.5286***

***C. 0.5286***

Answer: B

Correlation coefficient = (Coefficient of determination)$^{0.5}$

Correlation coefficient = $0.2795^{0.5}$ = 0.5286

As the slope coefficient provided in the regression is a negative figure, so the correlation coefficient (*r*) is −0.5286.

***III. The standard error is* closest to:**

***A. 0.0984***

***B. 0.1581***

***C. 0.0250***

Answer: B

Standard error = [SSE / (*n* – 2)]$^{0.5}$

Standard error = [47.428 / (1900 – 2)]$^{0.5}$ = 0.1581

***IV. The F-stat is* closest to:**

***A. 0.3879***

***B. 736.14***

***C. 0.0014***

Answer: B

*F*-stat = *MSR* / *MSE* = (*RSS* / 1) / [*SSE* / (*n* – *k* – 1)]

*F*-stat = (18.395 / 1) / [47.428 / (1900 – 1 – 1)] = 736.1413

***9. Consider the following statements:***

***Statement 1: The lower the risk aversion coefficient, the lower the negative impact of risk on portfolio utility.***

***Statement 2: The fact that indifference curves are upward sloping suggests that investors experience diminishing marginal utility of wealth.***

***Which of the following is most likely?***

***A. Only Statement 1 is correct.***

***B. Only Statement 2 is correct.***

***C. Both statements are incorrect.***

***D. Neither is correct.***

Answer: A

Statement 1 is correct. A lower risk aversion coefficient means that the effect of risk on portfolio utility will be lower.

The fact that indifference curves are curved suggests that investors exhibit diminishing marginal utility of wealth. As more risk is added to the portfolio, the increase in return required increases at an increasing rate. The upward slope of indifference curve tells us that investors are risk averse—in order to be indifferent between two portfolios with different levels of risk, the high risk portfolio must offer a higher return as well.

***10. The chief risk officer of your firm has asked you to decide between buying a futures contract on an exchange and buying a forward contract directly in the OTC Space with the firm's best client. Both have the identical terms. You find that the forward price is higher than the futures price. What single factor acting alone would be a realistic explanation for this price difference?***

***A. The asset is strongly negatively correlated with interest rates.***

***B. The futures contract is more liquid and easier to clear.***

***C. The forward contract counterparty has a higher default probability.***

***D. The convenience yield on the forward contract is less than on the futures contract.***

Answer: A

Forward contracts do not have a daily settlement feature and is the reason for the convexity impact on eurodollar futures. The futures contract has a "free" option on the potential to earn the risk-free rate of return on the mark to mark movement of the futures price. This free option impact—also called the convexity impact—is closely related to both volatility of the futures and how closely negatively correlated with interest rates the underlying asset is. If the futures contract moves higher in price, and you are long the future (hence have an overnight gain), that gain will be invested at lower rates.

***11. Sarah Carter is a trader in the arbitrage unit of a large bank. She finds that an asset is trading at USD 2,000, the price of a 1-year futures contract on that asset is USD 2,025, and the price of a 2-year futures contract is USD 2,055. Assume that there are no cash flows from the asset for two years. If the term structure of interest rates is flat at 1% per year, which of the following is an appropriate arbitrage strategy?***

***A. Short 2-year futures and long 1-year futures***

***B. Short 1-year futures and long 2-year futures***

***C. Short 2-year futures and long the underlying asset funded by borrowing for 2 years***

***D. Short 1-year futures and long the underlying asset funded by borrowing for 1 year***

Answer: C

The 1-year futures price should be $2000 \times e^{.01} = 2020.10$. The 2-year futures price should be $2000 \times e^{.01*2} = 2040.40$.

The current 2-year futures price in the market is overvalued compared to the theoretical price. To lock in a profit, you would short the 2 year futures, borrow USD 2000 at 1%, and buy the underlying asset. At the end of 2 years, you will sell the asset at USD 2,055 and return the borrowed money with interest, which would be $2{,}000 \times e^{.01*2} =$ USD2040.40, resulting in a USD 14.60 gain.

***12. You are examining the exchange rate between the U.S. dollar and the euro and are given the following information regarding the USD/EUR exchange rate and the respective domestic risk-free rates:***

***Current USD/EUR exchange rate is 1.35***

***Current USD-denominated 1-year risk-free interest rate is 1% per year. Current EUR-denominated 1-year risk-free interest rate is 2% per year***

***According to the interest rate parity theorem, what is the 1-year forward USD/EUR exchange rate?***

***A. 1.24***

***B. 0.95***

***C. 1.34***

***D. 1.37***

Answer: C

The forward rate, $F_T$, is given by the interest rate parity equation:

$$F_t = S_o \times e^{(r - r_f)T}$$

where

$S_o$ is the spot exchange rate,

$r$ is the domestic (USD) risk-free rate, and

$r_f$ is the foreign (EUR) risk-free rate.

$T$ is the time to delivery.

Substituting the values in the equation:

$Ft = 1.35 \times e^{(0.01 - 0.02)} = 1.336$

***13. Jacquie Chan is an analyst with Donahue Management Inc. She is studying value at risk as a means to measure and manage risk. Jacquie believes that using a risk budgeting program based on VaR could significantly enhance SIM's risk management processes. When presenting her idea to senior members of the firm, Jacquie receives the following responses:***

- ***Amanda Peters, Chief Market Strategist: We have a solid process in place to determine the optimal asset allocation for various market conditions. Risk budgeting is basically another way to conduct asset allocation.***
- ***Kathy Hu, Chief Compliance Officer: We have guidelines in place that include principal limits, sensitivity limits, and leverage limits. The thresholds set under a risk budget program accomplish the same thing.***
- ***Thomas Archer, Director of Portfolio Management: We already use tools such as beta, standard deviation, and duration to determine risk. These tools are widely used in the market and provide all the risk measurement we need.***

***Which of the following is the least effective response for Chan to use in countering Archer's argument?***

***A. When computed for fixed income portfolios, VaR uses interrelationships between different yield curves.***

***B. VaR accounts for illiquidity, which may be present in larger positions.***

***C. VaR is based on the current portfolio and does not require a large amount of historical data***

***for its computation.***

***D. VaR is based on tracking error and does not require a specific index for its computation.***

Answer: B

VaR accounts for illiquidity, which may be present in larger positions. Accounting for liquidity is actually a weakness

of VaR. On its own, VaR fails to distinguish the higher risk of a position that is too large for market liquidity versus a position that could easily be liquidated. The other answers all distinguish VaR from traditional risk measures: standard deviation is based on historical data and may not reflect the risk characteristics of a current portfolio, VaR does not require a specific index for its calculation, unlike beta, and VaR accounts for interrelationships between different yield curves.

***14. Ben Johnson, FRM, serves as a consultant to numerous risk management firms. He is currently advising RST Corporation on the implementation of a risk management program. RST is a newly formed company with little expertise in risk management, and has hired Johnson to train its staff.***

***A. Scenario analysis is useful for allowing risk managers to assess secondary consequences of changes in risk factors.***

***B. Scenario analysis is useful for assessing exposure to changes in the correlation between the component securities.***

***C. Scenario analysis is useful for discovering flaws in the risk measurement model and/or its assumptions.***

***D. Scenario analysis is useful for assessing exposure to changes in the volatility of the component securities.***

Answer: A

Scenario analysis is useful for allowing risk managers to assess secondary consequences of changes in risk factors.

The incorrect statement is that scenario analysis is useful for allowing risk managers to assess secondary consequences of changes in risk factors. Scenario analysis allows the managers to assess the impact of changes to various inputs into the risk measurement model. However, scenario analysis does not do a good job of assessing secondary effects of changes in the risk factors.

***15. You are discussing dynamic hedging with the chief risk officer who oversees all nonlinear risk at the enterprise level.***

***The debate is the incremental value of how often to hedge nonlinear option greeks under conditions of large market moves when the Federal Reserve continues to raise rates in 2016.***

***Before you can consider the transactional cost of hedging, you want to consider the incremental impact of the addition of an option hedge to the initial gamma and delta of the portfolio.***

***You have recently rebalanced the portfolio and added a new hedge consisting of 3,000 standard, exchange-traded equity option contracts to enforce a gamma-neutral position after a large market move.***

***With the addition of the gamma hedge, the original delta-neutral position also changes, so what trade must you do to restore delta neutrality after gamma hedging?***

***Assume a delta of 0.75 for the options.***

***A. Sell 225,000 shares of the underlying asset.***

***B. Buy 2,250 shares of the underlying asset.***

***C. Sell 500,000 shares of the underlying asset.***

***D. Buy 5,000 shares of the underlying asset.***

Answer: A

The addition of the 3,000 long options to bring about gamma neutrality disturbed the original delta neutral position of the portfolio.

Since 3,000 options have been added, (3,000)(0.75) = 2,250 contracts of the underlying must be sold to restore delta neutrality to the portfolio or 225,000 shares because the problem states these are standard (100 shares per contact).

Quick note: In the real world, the delta-gamma balance changes by the second. All GARP wants you to know is that "hedging" always has secondary impacts that need to be considered. The argument could be, after this delta hedge, what does the gamma hedge look like, and go back and forth to infinity. Just understand that nothing happens in a vacuum but more important why this changes.

***16. Albert Morrison is preparing a seminar on the term structure of interest rates.***

***In preparation for the seminar, Albert has taken the following sample data on daily yield changes for 10 year Treasuries. (Note: given yields are intentionally off market.)***

| Date | Yield |
|---|---|
| 01/11/2016 | 5.255 |
| 02/11/2016 | 5.262 |
| 03/11/2016 | 5.266 |
| 04/11/2016 | 5.311 |
| 05/11/2016 | 5.308 |
| 06/11/2016 | 5.299 |

***Albert calculates the sum of the squared deviations from the mean to be 0.6405.***

***Calculate the daily standard deviation of the data in the table.***

***A. 0.3812***

***B. 0.3579***

***C. 0.4002***

***D. 0.4210***

Answer: C

Note: This is at the upper limit if a tricky question and I almost hesitate to include it. Referring to the "sum of squared deviations from the mean" requires you to know the formula for variance and standard deviation. It also requires that you know you are calculating the change in rates, not just the average level of rates. The first data point isn't January of 2016 but rather a 1.3 basis point change in rates at the end of February of 2016. This also means we have 5 sample points of rate changes. Since you are told this is a sample, we have N – 1 in the denominator.

Daily standard deviation

$= \sqrt{(\text{sum of the squared deviations from mean} / (N-1))}$

$= \sqrt{(0.6405 / (5-1))}$

$= \sqrt{(0.6405 / 4)}$

$= \sqrt{(0.1601)}$

$= 0.4002$

*Good luck and stay on track.*
*Remember, good preparation is essential to success.*

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