

品职教育 FRM 一级考前必做题

各位品职的学员，大家好。

不知道复习到此时此刻，大家的心情究竟如何？

经过这半年的奋斗，大家听课就花费了数百小时，加上自己看书的时间，相信不管考试结果如何，这半年对大家来讲都是值得回忆的经历。

我们始终相信一分耕耘一分收获，努力就会有回报的。大家也要坚信这一点，经由过去的拼搏，平静的面对考试，笑对出成绩的一天。

这半年我们的课程李斯克与何旋两位老师花费了大量的心力去整理知识点之间的逻辑关系、按照考纲梳理需要大家掌握的考点、整理必会的经典题，相信完整的听完我们课程的同学应该都有充分的准备了。

在考前，最后为大家提供一套习题。之所以叫做必做题，是因为这套题“疑似”与考题相似度很高。但是，过去基础班、强化串讲课、经典题、总复习的讲解量已经非常大了，单就备考角度，我们提供的视频已经足够充分了，于是这套习题就不再给大家增加听课的负担，就不单独讲解了。

由于坊间传闻说本套试卷有参考性，所以，大家考前可以将这套题“读”一遍。“读”的意思，就是大致自己做一遍，对答案的选项有个印象即可，并不需要纠结答案本身，如果在考场有遇到类似的题目，可以直接作答即可。再次强调，不要纠结答案本身，对题目有个印象即可。

另外，有些考点已经不在了，但是题目中有，所以就归入相应的学科，如果有不熟悉的知识点，看看题目有个印象即可。

此外，认真理解知识点，方是备考良策，本套题目仅做参考，不要过度依赖。

祝大家考试顺利！

FRM一级考前必做题

Foundations of Risk Management

1. A risk analyst is stress testing a stock's return sensitivity to shocks in macroeconomic factors using a multifactor model. The analyst derives the following estimates for the factor betas:

$$\beta(\text{GDP})=1.00 \quad \beta(\text{Interest Rate})=-1.50$$

Under baseline expectations for GDP growth of 3.5% and an interest rate of 3.0%, the expected return for the stock is estimated to be 6.0%. Under which of the following scenarios will the stock have the highest expected return?

Scenario	GDP Growth (%)	Interest Rate (%)
A	-6.0	-1.0
B	-4.0	1.5
C	0.0	5.0
D	6.0	7.5

- A. Scenario A
- B. Scenario B
- C. Scenario C
- D. Scenario D

Answer: A

$$R_i = E(R_i) + \beta_{i,GDP} [GDP - E(GDP)] + \beta_{i,IR} [IR - E(IR)]$$

$$R_i = 6\% + [GDP - E(GDP)] - 1.5 \times [IR - E(IR)]$$

- A: 0.025
- B: 0.0075
- C: -0.005
- D: 0.0175

2. A risk analyst compiles alternate measures from the United Nations' database on the four countries below to compare the socio-economic conditions in each.

Country	Gini Coefficient	Human Development Index
U	0.305	0.821
V	0.236	0.892
W	0.315	0.909
Z	0.378	0.937

How would each country rank from having the most income inequality to the least income inequality?

- A. V>U>W>Z
- B. Z>W>U>V
- C. Z>W>V>U
- D. U>V>W>Z

Answer: B

The Gini coefficient is used to measure social inequality on a scale of zero to one, with zero being total equality and one being total inequality.

3. An equity analyst is preparing an analysis of a Belgian bank and has concluded that there is a 70% chance the bank will make a major acquisition at some point in the future which could lead rating agencies to downgrade the bank's credit rating. The analyst writes and distributes a report to institutional clients analyzing the bank using an internally developed valuation model. If included in the report, which of the following would be a violation of the GARP Code of Conduct?
- A. A discussion of recent trading patterns in the bank's stock by its senior executives.
 - B. A valuation matrix projecting several potential valuations and credit ratings for the bank given four hypothetical acquisitions.
 - C. A statement that there is a 70% chance that the bank will be downgraded within the next month.
 - D. A discussion of a possible trade in the stocks of several firms viewed as potential acquisition candidates.

Answer: C

According to GARP Code of Conduct: GARP Members Shall make a distinction between fact and opinion in the presentation of analysis and recommendations.

4. The CRO of an international bank is instructing direct reports on best practices for conducting country risk analysis and presenting the findings to senior executives. Which of the following recommendations would be considered the most questionable?
- A. Risk analysis should be open-ended, presenting several scenarios without assigning probabilities to them so as not to bias decision-makers.
 - B. Risk Reports should be informative, providing the end user the rationale behind any assessment without any “black boxes” that are difficult to understand.
 - C. Risk reports should be concise, with easy to understand conclusions that have sufficient detail to make them meaningful.
 - D. Risk analysis should be consistent, using rigorous frameworks that allow for valid cross-country comparison.

Answer: A

According to “Assessing Country Risk” in Valuation and Risk Models, risk analyses should be:

- Consistent and made using rigorous frameworks that allow for valid cross-country comparisons.
- Concise, with the conclusion easy to understand, but with sufficient detail to make it meaningful.
- Informative, giving the end user the rationale behind any assessment without any “black boxes” that are difficult to understand.
- Decisive, with a clearly defined position on prevailing country conditions and future implications.

5. The CRO of a small bank would like to estimate the loss frequency and severity distributions of the bank’s operational risk but is concerned that bank’s internal data may not have enough data points to develop a comprehensive analysis. Therefore, the CRO obtains additional external data from a consortium. What should the CRO do prior to merging the external data with the bank’s internal data?
- A. Merge the data as is because doing otherwise would violate Basel III anti-tampering regulation.
 - B. Scale the bank’s internal data so that it corresponds to the overall size of the banks whose data is included in the external data.
 - C. Scale the external data so that it corresponds to the data expected from a bank of similar size and scope as the small bank.
 - D. Scale both internal and external data so that the frequency and severity distributions fit the bank board’s expectation.

Answer: C

According to “Operational Risk” in Valuation and Risk Models, a scale adjustment should be made to external data. After the appropriate scale adjustment, data obtained through sharing arrangements

with other banks can be merged with the bank's own data to obtain a larger sample for determining the loss severity distribution.

6. A risk manager is analyzing the expected performance of a group of assets which are all benchmarked to the same market index. For the analysis, the risk manager assumes that the returns on the market index are greater than the risk-free rate and that the assumptions of the CAPM hold. Holding all other things constant, which of the following statements is correct?
- The expected return on an asset increases when its correlation with the market return decreases.
 - For an asset with a negative correlation of return to the market, an increase in the risk-free rate will decrease its expected return.
 - An asset with a beta of 2.5 will always have a higher standard deviation of return than an asset with a beta of 0.5.
 - When comparing two assets, the asset with the higher beta will always have the higher expected return.

Answer: D

Given that the returns on the market index are greater than risk-free rate, we can conclude: $E(R_M) > RF$. $E(R_M) - RF > 0$

$$E(R_i) = R_F + \beta_i [E(R_M) - R_F], \beta = \rho_{i,M} \frac{\sigma_i}{\sigma_M}$$

7. An equity analyst is estimating the return of a stock using the CAPM. The analyst compiles the following information and correctly calculates the expected return for stock as 7.2%.

Risk-free rate	3.0%
Beta of stock	1.4
Correlation between the stock return and market return	0.7
Standard deviation of stock return	5.0%

The risk team reviews the analyst's work and discovers that analyst has input an incorrect correlation estimate; the proper correlation is 0.6. Assuming all other input are unchanged and correct, what is the correct expected return for stock using the CAPM?

- 6.2%
- 6.6%

- C. 7.9%
- D. 8.4%

Answer: B

$$\begin{aligned}
 E(R_i) &= R_f + \beta [E(R_M) - R_f] \\
 7.2\% &= 3\% + 1.4 [E(R_M) - R_f] \\
 [E(R_M) - R_f] &= 0.03 \\
 \beta = \rho \frac{\sigma_i}{\sigma_M} &= 1.4 = 0.7 \times \frac{5\%}{\sigma_M} \Rightarrow \sigma_M = 2.5\% \\
 \beta' &= 0.6 \times \frac{5\%}{2.5\%} = 1.2 \\
 E'(R_i) &= R_f + \beta' [E(R_M) - R_f] = 3\% + 1.2 \times 0.03 = 0.066
 \end{aligned}$$

8. In preparation for a briefing to the board of directors, the CRO considers specific explanations as to why certain risks should be hedged. Which of the following would be an accurate explanation of the impact of hedging risk exposures on shareholder wealth?
- A. Hedging increases the variability of the firm's profits, making the firm a more attractive investment for stakeholders.
 - B. Hedging reduces a firm's expected costs of financial distress.
 - C. Hedging does not increase shareholder wealth because shareholders have diversified portfolios.
 - D. Hedging with derivatives reduces the compliance and operational costs of the firm.

Answer: B

When a firm has risky debt in its capital structure, there is some probability that the firm's operating income will be insufficient to pay the debt holders. In this case the firm may file for bankruptcy. In the real world, it is costly for firms to file for bankruptcy. Firms have to hire lawyers, incur court costs, and need to pay for all sorts of financial advice. Costs incurred as a result of a bankruptcy filing are called bankruptcy costs. The present value of future bankruptcy costs reduces the value of a firm. However, hedging can reduce cash flow volatility so that the present value of bankruptcy costs decreases because bankruptcy becomes less likely.

9. A bank's risk committee is reviewing the bank's most significant loss events and categorizing each event into specific risk categories. In one case, a model operator input the wrong price for a security into an algorithm used for trading, which then caused the algorithm to buy instead of sell the security. This situation would be an example of:
- A. Market risk.
 - B. Operational risk.

- C. Strategic risk.
- D. Liquidity risk.

Answer: B

10. A pension fund manager is reviewing the 4-year performance of an equity fund benchmarked to a market index. Over this time period, the fund's active investment decisions have resulted in a different beta relative to the index for each 1-year period. The manager has the following information about the fund and the market portfolio:

Year	Estimated Beta	Equity Fund Return (%)	Market Portfolio Return (%)
1	0.8	6.00	4.50
2	1.1	10.50	9.50
3	1.3	-2.50	-3.50
4	0.7	4.00	3.50

If the risk-free rate remained constant at 1.5% over the entire 4-year period, for which year did the fund have the highest Jensen's alpha?

- A. Year 1
- B. Year 2
- C. Year 3
- D. Year 4

Answer: C

Jensen's alpha = Equity Fund Return – R_f – Beta × (Market Portfolio Return – R_f)

Year 1: $0.06 - 0.015 - 0.8 \times (0.045 - 0.015) = 0.021$

Year 2: $0.105 - 0.015 - 1.1 \times (0.095 - 0.015) = 0.002$

Year 3: $-0.025 - 0.015 - 1.3 \times (-0.035 - 0.015) = 0.025$

Year 4: $0.04 - 0.015 - 0.7 \times (0.035 - 0.015) = 0.011$

11. To improve its corporate governance, the board of a local bank has established an audit committee. Which of the following would be an appropriate role for the audit committee?
- A. To define the firm's risk management strategy.
 - B. To evaluate the quality of the risk management process.
 - C. To undertake risk management functions on a day to day basis.

- D. To ensure that a firm minimizes its exposure to risks.

Answer: B

The audit committee is responsible not only for the accuracy of the bank's financial and regulatory reporting, but also for ensuring that the bank complies with minimum or best-practice standards in other key activities, such as regulatory, legal, compliance, and risk management activities.

12. The board of directors at a large bank is considering creating a CRO position. Which of the following would be an appropriate description of a function of the CRO position?

- A. Develop risk management policies and communicate the company's risk profile to key stakeholders.
- B. Perform backtests and scenario analyses to test assumptions in the bank's risk models.
- C. Independently approve changes in the bank's risk tolerance and its risk appetite framework.
- D. Establish and execute risk transfer strategies on a day-to-day basis.

Answer: A

Role and Responsibilities of CRO

- Providing the overall leadership, vision, and direction for enterprise risk management;
- Establishing an integrated risk management framework for all aspects of risks across the organization;
- Developing risk management policies, including the quantification of the firm's risk appetite through specific risk limits;
- Implementing a set of risk indicators and reports, including losses and incidents, key risk exposures, and early warning indicators;
- Allocating economic capital to business activities based on risk, and optimizing the company's risk portfolio through business activities and risk transfer strategies;
- Communicating the company's risk profile to key stakeholders such as the board of directors, regulators, stock analysts, rating agencies, and business partners; and
- Developing the analytical, systems, and data management capabilities to support the risk management program.

13. An effective risk governance strategy at a large global bank requires strong participation by the board of directors. Which of the following duties should be the responsibility of the board of directors?

- A. Establishing strong ethical standards and ensuring that senior management follows them.
- B. Developing quantitative formulas for management to use to determine whether a risk should

- be hedged.
- C. Defining and running stress tests and scenarios to assess the bank's vulnerability to a severe financial downturn.
 - D. Managing a division that implements hedging strategies for the bank's key risk exposures.

Answer: A

The Board of Directors is ultimately responsible for risk oversight.

14. In order to strengthen trading controls, a firm's risk manager is studying cases of large trading losses at financial institutions. In particular, the manager considers the lessons learned from the Allied Irish Bank and Barings trading losses. Which of the following describes a lesson that can be drawn from these cases applied to risk management and trading controls?
- A. Algorithmic trading models should be reviewed before implementation, so that trading losses from model errors do not occur.
 - B. Trading assistants should report directly to the traders they work with, to ensure alignment of incentives and the smooth flow of information.
 - C. Net positions rather than gross positions should be monitored for each trader, to ensure the impact on the institution is fully measured.
 - D. Cash and collateral requirements should be compared to a trader's reported position size, since fictitious transactions do not result in cash or collateral movements.

Answer: D

Both cases are relative to fictitious transactions.

15. An analyst at an asset management firm wants to evaluate the performance of several portfolios, all of which are benchmarked to the same index. Assuming that these portfolios have different levels of risk, which performance measure would be most appropriate in comparing the performance of these portfolios relative to their level of systematic risk?
- A. Treynor ratio
 - B. Sharpe ratio
 - C. Jensen's alpha
 - D. Sortino ratio

Answer: A

Treynor ratio is equal to the risk premium divided by beta (systematic risk).

16. A bank's investment analyst is preparing to value several equities in the bank's portfolio and is comparing different theories related to the discount rate that should be applied to equity cash flows. Which of the following statements is correct with respect to the arbitrage pricing theory (APT)?
- A. When an APT factor beta is positive, an increase in the risk premium will lead to a decrease in the asset's expected return.
 - B. The APT assumes all company specific risks can be completely diversified away in a portfolio.
 - C. In an APT model, the factor betas for the market portfolio are typically equal to 1.
 - D. The APT assumes that all investors hold mean-variance efficient portfolios and will make small portfolio changes when a mispriced security exists.

Answer: B

Each factor portfolio in APT model is a well-diversified portfolio that has a beta equal to one of a single risk factor and betas equal to zero on the remaining factors. There is not necessary a market portfolio existing in the APT model. When an APT factor beta is positive, an increase in the risk premium will lead to an increase in the asset's expected return.

17. Which of the following represents a significant weakness of single-factor approaches to hedging interest rate risk?
- A. Single-factor approaches do not account for arbitrage opportunities among bonds with the same maturity but different coupon rates.
 - B. Single-factor approaches assume a correlation of 1.0 among interest rate changes across the entire yield curve.
 - C. Single-factor approaches assume that the short-term rate will converge to the long-term rate.
 - D. Single-factor approaches cannot be used to forecast future interest rates.

Answer: B

18. A bank's risk manager has been asked by the firm's CFO to describe the Basel Committee's principles for effective risk data aggregation and reporting. In particular, the CFO wants to know the key benefits and costs of adhering to these principles. Which of the following most accurately describes the effects of implementing the Basel recommendations on data aggregation and risk reporting?
- A. Increased expected long-term profitability, but significant initial investments for banks.
 - B. Faster decision making for banks, but increased potential to generate systemic risk.
 - C. Efficient gains for banks, but reduced ability to find a suitable merge partner.

- D. Reduced probability of losses, but increased magnitude of losses when they occur.

Answer: B

19. An insurance company has hired a risk consultant to advise the firm on its implementation of a risk appetite framework (RAF) across the firm. Which recommendation would most closely reflect best practices in implementing an effective firm-wide RAF?
- A. Structure the RAF to include a large number of granular limits covering a wide array of risk exposures at the firm.
 - B. Encourage information technology staff to develop and implement an RAF for individual business units.
 - C. Focus the RAF on the interaction between the CRO and risk management staff.
 - D. Institute a training program to educate staff on the benefits of adhering to the RAF.

Answer: D

20. An audit committee at a regional bank has identified weaknesses in the bank's data aggregation and risk reporting practices and has suggested that the bank upgrade its capabilities in order to comply with the Basel guidelines. What is one of the key functionalities the bank should be expected to achieve?
- A. Develop an independent data warehouse for each business division to meet its specific risk reporting needs.
 - B. Enhance the reporting function to provide early notifications about potential breaches of risk limits.
 - C. Internalize the bank's risk data collection process by eliminating the use of outsourced data service providers.
 - D. Develop a fully quantitative risk report which is delivered regularly to the board of directors.

Answer: B

Quantitative

21. To estimate the price of a call option, an analyst performs a simulation with 100 scenarios and estimates the 95% confidence interval for the call option price as [4.55; 5.15]. In order to increase the accuracy of the pricing results, a second simulation with 400 scenarios is

performed. Assuming that the second simulation generated the same sample mean of 4.85 and the same sample standard deviation of 1.50, given one tailed critical values of the t-distribution of $t(97.5\%, 99) = 1.98$ and $t(97.5\%, 399) = 1.97$, what is the new 95% confidence interval?

- A. [4.63; 5.07]
- B. [4.70; 5.00]
- C. [4.82; 4.88]
- D. [4.84; 4.86]

Answer: B

Simulation one:

$$\begin{aligned}\text{Confidence interval} &= [\mu - 1.98 \times s / \sqrt{100}, \mu + 1.98 \times s / \sqrt{100}] \\ &= [4.85 - 1.98 \times 1.5 / \sqrt{100}, 4.85 + 1.98 \times 1.5 / \sqrt{100}] \\ &= [4.55, 5.15]\end{aligned}$$

Simulation two:

$$\begin{aligned}\text{Confidence interval} &= [\mu - 1.97 \times s / \sqrt{400}, \mu + 1.97 \times s / \sqrt{400}] \\ &= [4.70, 5.00]\end{aligned}$$

22. A junior analyst on a foreign exchange trading desk has been analyzing the relationship between the Swiss franc and the US dollar since the recent removal by the Swiss central bank of a cap on the franc's movement against the euro. The analyst randomly selected the following give daily CHF/USD exchange rates from the past 5 months:

Day	CHF/USD
1	1.12
2	1.08
3	1.13
4	1.07
5	1.15

Based on the data above, what is the unbiased estimate of the daily CHF/USD exchange rate mean and standard deviation?

- A. Mean = 1.12; Standard deviation = 0.030
- B. Mean = 1.12; Standard deviation = 0.034
- C. Mean = 1.11; Standard deviation = 0.030
- D. Mean = 1.11; Standard deviation = 0.034

Answer: D

$$\text{Sample Mean} = \frac{1.12 + 1.08 + 1.13 + 1.07 + 1.15}{5} = 1.11$$

$$\text{Sample Variance} = \frac{1}{4} \left[(1.12 - 1.11)^2 + (1.08 - 1.11)^2 + (1.13 - 1.11)^2 + (1.07 - 1.11)^2 + (1.15 - 1.11)^2 \right] = 0.00115$$

$$\text{Sample Standard Deviation} = \sqrt{0.00115} = 0.0340$$

23. A risk manager is backtesting a firm's model for estimating 1-day 99% VaR and observes five exceedances over the prior 150 trading days. Assuming the model is correctly calibrated, and all the exceedances are independent of each other, what is the probability that there were exactly six exceedances over the prior 250 trading days?
- A. 0.84%
 - B. 2.75%
 - C. 36.97%
 - D. 39.25%

Answer: B

$$P(X=6) = C_{250}^6 (0.01)^6 (0.99)^{244} = 2.75\%$$

24. The level of the FTSE 100 index at close of trading yesterday was 6,480 and the daily volatility of the index return was estimated as 1.5%. Today, the level of the FTSE 100 at close of trading is 6,400. A risk manager models the distribution of the daily returns on the FTSE 100 index assuming a mean of 0% and a variance given by the following GARCH(1,1) model:

$$\sigma_t^2 = 0.000014 + 0.07u_{t-1}^2 + 0.85\sigma_{t-1}^2$$

- Which of the following is closest to the risk manager's forecast of the next trading day's 1-standard deviation confidence interval around the expected value of the FTSE 100 index level?
- A. [6,200;6600]
 - B. [6,250;6450]
 - C. [6,300;6500]
 - D. [6,359;6450]

Answer: C

$$\mu_{t-1} = \frac{6400 - 6480}{6480} = -0.0123$$

$$\sigma_t^2 = 0.000014 + 0.07 \times (-0.0123)^2 + 0.85 \times (1.5\%)^2 = 0.000216$$

$$\sigma_t = 0.0147$$

$$6400 - 6400 \times 0.0147 = 6306$$

$$6400 + 6400 \times 0.0147 = 6494$$

25. An analyst runs three separate regressions using the returns on stock XYZ (STOCK), changes in the price of oil (OIL), and changes in the yield on the 3-month T-bill (BILL). The regression equations and summary results, including estimated parameters, are given in the table below:

		b_0	b_1
Regression 1	STOCK = $b_0 + b_1 \times OIL$	-0.0002	0.67
	Standard Error	0.0004	0.039
	t-statistic	-0.4	17.18
	R ²	0.45	
Regression 2	STOCK = $b_0 + b_1 \times BILL$	-0.0006	1.38
	Standard Error	0.0004	0.033
	t-statistic	-1.5	41.82
	R ²	0.67	
Regression 3	OIL = $b_0 + b_1 \times BILL$	0.00025	0.063
	Standard Error	0.0003	0.024
	t-statistic	0.83	2.63
	R ²	0.35	

Based on the information above, which of the following statements is correct?

- A. The coefficient on BILL in Regression 2 likely has upward bias because changes in interest rates are homoskedastic.
- B. The coefficient on OIL in Regression 1 likely has upward bias due to omitted variable bias.
- C. The R² in Regression 2 is high due to multicollinearity.
- D. The estimated intercept in Regression 3 indicates that OIL should have a significantly positive average return.

Answer: B

- If the variance of the residuals is constant across all observations in the sample, the regression is said to be homoskedastic.

- We conclude the coefficient on OIL in Regression 1 is significant. Also, the coefficient on BILL in Regression 3 is significant. That means the regressor in Regression 1 is correlated with the omitted variable BILL. Therefore, there is omitted variable bias.

Omitted variable bias should satisfy two conditions:

- 1) At least one of the included regressors must be correlated with the omitted variable.
 - 2) The omitted variable must be a determinant of the dependent variable, Y.
- Some authors have suggested a formal detection-tolerance or the variance inflation factor (VIF) for multicollinearity.

$$\text{tolerance} = 1 - R^2, \text{VIF} = \frac{1}{\text{tolerance}}$$

where R^2 is the coefficient of determination of a regression of explanatory j on all the other explanators. A tolerance of less than 0.20 or 0.10 and/or a VIF of 5 or 10 and above indicates a multicollinearity problem. Therefore, C is wrong.

- The t-statistic of intercept in Regression 3 = 0.83. Although the intercept is above 0, it is not significant.

26. A risk analyst is examining the autocorrelation function of a covariance stationary series of 400 data points. The risk analyst estimates the mean of the first 100 autocorrelations of the series as 0.0002 with a standard deviation of 0.0225. To test if the series was generated by a white noise process, the analyst calculates the Box-Pierce Q-statistic, which approximately follows $a(n)$:
- F-distribution.
 - Chi-squared distribution.
 - Student's t distribution.
 - Standard normal distribution.

Answer: B

The Box-Pierce Q-statistic

$$Q_{BP} = T \sum_{t=1}^m \hat{\rho}^2(t)$$

is approximately distributed as a χ^2_m random variable under the null hypothesis that y is white noise.

27. When conducting an ordinary least squares multiple regression using the model $Y_i = a + b_1 X_{1i} +$

$b_2 X_{2i} + \varepsilon_i$, which of the following conditions would most likely indicate that there is heteroskedasticity?

- A. The R^2 of the regression is low.
- B. The correlation coefficient between X_1 and X_2 is greater than 0.6.
- C. The conditional variance, $\text{var}(\varepsilon_i | X_{1i}, X_{2i})$, is not constant.
- D. The conditional mean, $E(\varepsilon_i | X_{1i}, X_{2i})$, is not zero.

Answer: C

If the variance of the residuals is constant across all observations in the sample, the regression is said to be homoskedastic. If the variance of the residuals is not the same across all observations in the sample, the regression is said to be heteroskedasticity.

28. A risk analyst is modeling the default correlation between two loans in a portfolio by applying a Gaussian copula model on the default times. When used with two input variables, a Gaussian copula:

- A. Provides more tail dependence than other copulas.
- B. Maps the input variables into new variables that follow a bivariate Student-t distribution.
- C. Keeps the copula correlation equal to the correlation between the input variables.
- D. Preserves the marginal distributions of the input variables while defining a correlation structure between them.

Answer: D

Gaussian Copula provides few tail dependence and maps the input variables into new variables that follow a normal distribution. It employs the copula correlation as one of its inputs and preserves the marginal distributions of the input variables.

29. A risk analyst seeks to model the frequency of operational loss events. Which of the following distributions would be the most appropriate for this purpose?

- A. Geometric
- B. Bernoulli
- C. Binomial
- D. Poisson

Answer: D

Loss frequency is most often modeled with a Poisson distribution.

30. An analyst is regressing the returns of a portfolio on the returns of a benchmark. The correlation between the returns of the portfolio and the returns of benchmark is 0.6. Assuming that the total sum of squares in this regression is 50,000 and the slope coefficient is 1.2, what is the explained sum of squares?
- A. 18,000
 - B. 30,000
 - C. 60,000
 - D. 72,000

Answer: A

$$R^2 = \rho^2 = 0.6^2 = 0.36$$

$$R^2 = \frac{ESS}{TSS}$$

$$ESS = R^2 \times TSS = 0.36 \times 50000 = 18000$$

31. A risk analyst is working on creating a regression model to forecast defaults within a portfolio of residential mortgages. After estimating a regression with a single regressor, a second regressor was added and the R^2 for the model increased. The increase in R^2 indicates that:
- A. The new regressor is a statistically significant predictor variable.
 - B. The new regressor is a better indicator of variance in mortgage defaults than the first regressor.
 - C. The estimated coefficient on the second regressor is different from zero.
 - D. There is no omitted variable bias in this model when including the second regressor.

Answer: C

The higher R^2 indicates that the second regressor is a determination of the dependent. So the estimated coefficient on the second regressor is different from zero.

32. A portfolio manager estimates the following GARCH(1,1) model based on the daily returns of a stock:

$$\sigma_t^2 = 0.000175 + 0.025u_{t-1}^2 + 0.82\sigma_{t-1}^2$$

The annualized rate of return of the stock is 15% and the annual risk-free rate is 5%. Assuming that there are 250 trading days in a year and using the long-term daily volatility from the GARCH(1,1) model, which of the following is closest to the annualized Sharpe ratio of the stock?

- A. 0.19
- B. 0.28

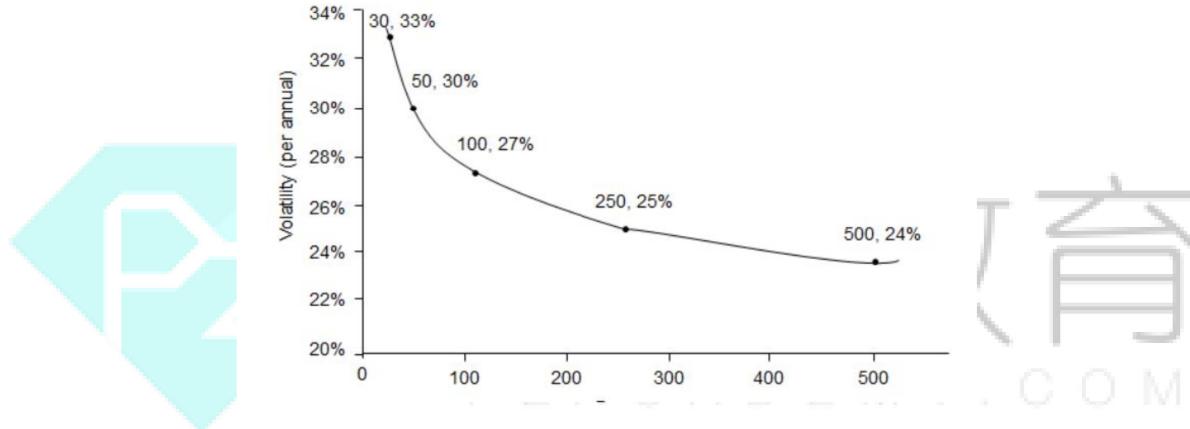
- C. 0.48
D. 0.72

Answer: A

$$\sigma_L = \sqrt{\frac{0.000175}{1 - 0.025 - 0.82}} = 3.36\%$$

$$SR = \frac{E(R_P) - R_F}{\sigma} = \frac{15\% - 5\%}{3.36\% \times \sqrt{250}} = 0.19$$

33. The following chart shows the predicted annualized volatility term structure of a stock estimated from a GARCH(1,1) model.



With specific predicted volatility values marked on the chart, assuming that there are 252 trading days in a year, which of the following statements is correct?

- A. The best estimate of the implied volatility is 0.24.
 B. The GARCH(1,1) model estimates a downward-sloping implied volatility term structure.
 C. Long-term options on the stock are undervalued while short-term options on the stock are overvalued.
 D. The current daily variance is greater than 0.00023.

Answer:

$$\left(\frac{33\%}{\sqrt{252}}\right)^2 = 0.000432 > 0.00023$$

本题条件不足，图形未给出横坐标及曲线解释，是错题。

34. A risk manager is estimating the average monthly returns of four funds based on the last 4 years

of monthly returns as shown in the following table:

	Average Monthly Return (%)	Standard Deviation (%)
Fund A	0.21	1.13
Fund B	0.47	3.42
Fund C	0.54	1.98
Fund D	0.67	2.19

The risk manager is also given the following one-sided critical values of the t-distribution:

Degrees of freedom	Confidence Level		
	90%	95%	97.5%
3	1.64	2.35	3.18
47	1.30	1.68	2.01
1000	1.28	1.65	1.96

For which of the funds can the null hypothesis that the mean monthly return is 0% be rejected at the 95% confidence level but the null hypothesis that the average monthly return is less than 0.5% be rejected at the 95% confidence level?

- A. Fund A
- B. Fund B
- C. Fund C
- D. Fund D

Answer: D

$$1: H_0: \mu = 0, H_a: \mu \neq 0$$

$$t_A = \frac{0.21}{1.13 / \sqrt{48}} = 1.29 \quad t_B = \frac{0.47}{3.42 / \sqrt{48}} = 0.95$$

$$t_C = \frac{0.54}{1.98 / \sqrt{48}} = 1.89 \quad t_D = \frac{0.67}{2.19 / \sqrt{48}} = 2.12$$

$$2: H_0: \mu < 0.5\%, H_a: \mu \geq 0.5\%$$

$$t_C = \frac{0.54 - 0.5\%}{1.98 / \sqrt{48}} = 1.71 \quad t_D = \frac{0.67 - 0.5\%}{2.19 / \sqrt{48}} = 2.10$$

表格里给的是 **one-sided critical value**, 第一个 **hypothesis testing** 应该用 **97.5%**, **DF=47**, 也就是 **2.01** 来判断, 只有 **D** 被拒绝。第二个假设检验用 **95%**, **自由度 47**, 也就是 **1.68** 来判断, 落入拒绝域, 也被拒绝。

35. A firm is concerned about potential increases in the federal funds rate and their impact on the S&P 500. For a 3-month forecast period, the firm's economics team estimates the following:

- A 0% probability that the Federal Reserve will lower the federal funds rate.
 - A 60% probability that the Federal Reserve will not raise the federal funds rate.
 - A 32% probability that the return on the S&P 500 will be between -10% and +10%.
 - A 38% chance that the return on the S&P 500 will be less than -10%.
 - A 24% joint probability that the return on the S&P 500 will be greater than 10% and that the Federal Reserve will not raise the federal funds rate. Based on the estimates above, given that the Federal Reserve raises the federal funds rate, what is the probability that the return on the S&P 500 is greater than 10%?
- A. 10%
- B. 15%
- C. 20%
- D. 40%

Answer: B

The chance that the return on the S&P 500 will be more than 10% is $1 - 38\% - 32\% = 30\%$.

$$\frac{30\% \times (1 - 24\% / 30\%)}{1 - 60\%} = 15\%$$

36. An analyst has asked to select a model to forecast EUR/USD foreign exchange rates based on seasonally-adjusted, monthly historical trading data for the years 2000 through 2014. To examine out-of-sample forecasting performance, the “hold-out-sample” of 2014 data is used. The analyst wants to select the model with the smallest out-of-sample one-step-ahead mean squared prediction error. Which of the following in-sample properties indicates the best choice of trend forecasting model?
- A. A Schwarz information criterion value that is lower than that of other models.
- B. An Akaike information criterion value that is higher than that of other models.
- C. An R^2 that is lower than that of other models.
- D. A mean squared error that is lower than that of other models.

Answer: A

37. An analyst is trying to determine the quality of a pool of loans using default data. The analyst knows that of all pools, 10% are Low Risk, 70% are Average Risk. Each month, there is a 90% probability that a Low Risk pool has no defaults, an 80% chance that an Average Risk pool has no defaults and a 70% chance that a High Risk pool has no defaults. If in one month the pool checked by the analyst did have defaults, what is the probability that this pool is either Low Risk

or Average Risk?

- A. 28.57%
- B. 33.33%
- C. 66.67%
- D. 71.43%

Answer: D

$$\frac{10\% \times (1 - 90\%) + 70\% \times (1 - 80\%)}{10\% \times (1 - 90\%) + 70\% \times (1 - 80\%) + 20\% \times (1 - 70\%)} = 71.4\%$$

38. An analyst is attempting to simulate the returns of two assets that follow a multivariate standard normal distribution with a correlation of 0.4. The risk manager first simulates the returns of one asset, R_1 , with 1,000 draws from a standard normal distribution. Next, the analyst assigns an additional 1,000 draws from another independent standard normal distribution to variable Z_1 . To create a variable, R_2 , that has a correlation of approximately 0.4 with R_1 , which of the following formulas should be used?

- A. $R_2 = 0.40 * R_1 + 0.92 * Z_1$
- B. $R_2 = 0.40 * R_1 + 0.84 * Z_1$
- C. $R_2 = 0.40 * R_1 + 0.60 * Z_1$
- D. $R_2 = 0.40 * R_1 + 0.77 * Z_1$



Answer: A

乔磊斯基因子分解，handbook出现过。超纲题。

39. The parameters of a normal distribution have been estimated from an extremely large data set. The critical value of 2.33 is used to form a two-sided confidence interval around the sample mean, based on the distribution parameters estimated. A correct statement regarding the confidence interval is that:

- A. 5% of the distribution is outside the confidence interval.
- B. There is a 1% probability of a particular observation failing either below the range or above the range of the confidence interval.
- C. There is a 1% probability of a particular observation failing below the range of the confidence interval.
- D. 99.5% of all observations will be within the confidence interval.

Answer: C

According to a normal distribution, the critical value of 2.33 denotes a 98% confidence level based on two-side. The significance level is 2% with 1% each side. So there is a 1% probability of a particular observation failing below the range of the confidence interval.

Financial Market And Product

40. A company is expected to announce the terms of a materially important contract negotiation in early April. A trader expects the company's stock to be range-bound until then and has entered into a position that is short 100 March calls with a strike price of USD 50 and long 100 April calls with a strike price of USD 50. After some consideration, the risk committee believes there is a possibility that the news will be released in mid-March and informs the trade of this change. Based on the new information, the trader sells the 100 April calls and buys 50 March calls with a strike at USD 30 and 50 March calls with a strike at USD 70. What types of positions did the trader have?
- A. The original position was long a call spread and the final position was long a strangle.
 - B. The original position was long a calendar spread and the final position was long a butterfly spread.
 - C. The original position was long a reverse calendar spread and final position was long a call spread.
 - D. The original position was long a calendar spread and the final position was short a butterfly spread.

Answer: B

A calendar spread can be created by selling a European call option with a certain strike price and buying a longer-maturity European call option with the same strike price. The reverse calendar spread is the opposite which buy a short-maturity option and sell a long-maturity option. The original position is short 100 March calls with a strike price of USD 50 and long 100 April calls with a strike price of USD 50. Therefore, it is a calendar spread.

A butterfly spread involves positions in options with three different strike prices. It can be created by buying a European call option with a relatively low strike price K1, buying a European call option with a relatively high strike price K3, and selling two European call options with a strike price that is halfway between K1 and K3. The final position is sells the 100 April calls (from the given data, we can guess the strike price will be 50) and buys 50 March calls with a strike at USD 30 and 50 March calls with a strike at USD 70.

41. Consider the following futures prices:

Long Gilt Future – ICEU									
Contract	Month	Last	Chg	Open	High	Low	Volume	OpenInt	Date
Long Gilt Future – Mar 1	Mar 15	121.02	-0.18	120.96	121.14	120.92	28051	413074	01/12/15

Volume and OpenInt refer respectively to which of follow?

- A. The nominal value of contracts exchanged that day and the total number of contracts sold that day.
- B. The total number of contracts exchanged during that day and the number of contracts that are outstanding at the end of the day.
- C. The nominal value of all contracts sold during that day and number of contracts that are outstanding at the end of the day.
- D. The total number of contracts sold that day and total number of contracts that have been created since the opening of the contract.

Answer: B

Volume is defined as the total of purchases or sales during a trading session, not the total of purchases and sales combined.

Open interest represents a tabulation of the total number of futures contracts in a market that remain “open” at the end of a trading session, that is, those contracts not yet liquidated either by an offsetting futures market transaction or by delivery

42. A US company sells products in many countries but cannot always convert its foreign currency earnings back into USD. In Venezuela the company is unable to hedge the currency exposure of its earnings, and spot market transactions are not possible due to recently implemented currency controls. The bolivar fuerte (VEF) last traded at USD 1 = VEF 6; at that time the company calculated it had the equivalent of USD 50 million denominated in VEF. The company is required to estimate gains and losses in its foreign currency position. The company's economists use purchasing power parity to estimate that the exchange rate would now be USD 1 = VEF 7.2275 if it were traded. Assuming the real rate of interest is constant and equal in both countries, which of the following statements is true?

- A. The reported gain should be USD 10.2 million, and Venezuela had a higher inflation rate than the US.

- B. The reported loss should be USD 8.5 million, and Venezuela had a lower inflation rate than the US.
- C. The reported loss should be USD 10.2 million, and Venezuela had a higher inflation rate than the US.
- D. The reported loss should be USD 8.5 million, and Venezuela had a higher inflation rate than the US.

Answer: D

The bolívar fuerte (VEF) last traded at USD 1 = VEF 6 while the economists estimate the exchange rate now would be USD 1 = VEF 7.2275. Therefore VEF depreciated, and the inflation rate of Venezuela had a higher inflation rate than the US.

At the beginning, the company had equivalent of USD 50 million denominated in VEF with USD 1 = VEF 6, which is VEF 300 million. With exchange rate of USD 1 = VEF 7.2275 now, the company will loss USD 8.5 million.

43. A large manufacturer of medical devices expects to purchase 1900 tons of a specific grade of steel known as "Marine Grade Stainless" in three months. Since futures contracts are not available on this type of steel. The risk manager suggests using the US Midwest Domestic Hot-Rolled Coil Steel Index Futures Contract to hedge against an increase in steel prices. The contract size is 20 tons and the 3-month futures price is USD 597 per ton.

Using 250 days of historical information, the manager estimates that the standard deviation of changes in the spot price of steel is 0.045 and the standard deviation of changes in futures prices is 0.05. The correlation between changes in the spot and futures price is estimated at 0.90. Which of the following best describes the correct course of action for the risk manager?

- A. Buy 77 futures contracts
- B. Sell 77 futures contracts
- C. Buy 95 futures contracts
- D. Sell 95 futures contracts

Answer: A

$$\text{Hedge Ratio} = 0.9 \times \frac{0.045}{0.05} = 0.81$$

$$N = 0.81 \times \frac{1900}{20} = 77$$

Since the manufacturer expects to purchase in three months, they should buy the futures contracts.

44. The table below shows a US bank's positions in foreign currencies, assets and liabilities.

	Assets	Liabilities	FX Bought	FX Sold
Euros(EUR)	9,000,500	8,500,500	2,000,000	1,000,000
British Pounds(GBP)	5,000,000	6,000,000	4,000,000	500,000
Japanese Yen(JPY)	100,000,000	120,000,000	30,000,000	1,300,000
Australian Dollar(AUD)	1,000,000	500,000	4,500,000	3,500,000

Which of the following changes would result in a decrease in the bank's net exposure to these currencies?

- A. A purchase of AUD 1,000,000, an increase in JPY liabilities of JPY 2,000,000, and a purchase of JPY 2,000,000
- B. A sale of GBP 500,000, an increase in GBP assets of GBP 500,000, and a decrease in AUD liabilities of AUD 500,000
- C. An increase in EUR liabilities of EUR 1,000,000, an increase in GBP liabilities of GBP 1,000,000, and an increase in AUD liabilities of AUD 1,000,000
- D. An increase in EUR assets of EUR 4,000,000, an increase in EUR liabilities of EUR 2,000,000, and a sale of EUR 2,000,000

Answer: C

Net Exposure

$$\begin{aligned}
 &= (\text{FX asset}_i - \text{FX liabilities}_i) + (\text{FX bought}_i - \text{FX sold}_i) \\
 &= \text{net foreign assets}_i + \text{Net FX bought}_i
 \end{aligned}$$

Initial Exposure: EUR1,500,000; GBP2,500,000; JPY8,700,000; AUD1,500,000

- A: EUR1,500,000; GBP2,500,000; JPY8,700,000; AUD2,500,000
- B: EUR1,500,000; GBP2,500,000; JPY8,700,000; AUD2,000,000
- C: EUR500,000; GBP1,500,000; JPY8,700,000; AUD500,000
- D: EUR1,500,000; GBP2,500,000; JPY8,700,000; AUD1,500,000

45. A firm is contemplating a hedge on a copper position using either futures contracts or options.

The current spot price of copper is USD 875 per pound while a September futures contract is currently trading at USD 925 per pound. There are also June USD 925 calls that are currently quoted at USD 20 and June USD 925 puts that are currently quoted at USD 22. If the basis stays the same and the spot price of copper increases to USD 900 per pound by the time of the expiration of the June options, what should the value in USD of a long hedge in futures and a long position in calls, respectively, be at that time?

- A. -25; -20
- B. 25; -20
- C. -25; 20
- D. 25; 20

Answer: B

Long futures: $F_t - F_0$

Given that the basis stays the same, so that:

$$\text{Basis} = S_0 - F_0 = 875 - 925 = S_t - F_t = 900 - F_t$$

$$F_t = 950$$

$$F_t - F_0 = 950 - 925 = 25$$

$$\text{Long call: } \text{Max}(S_t - K, 0) - 20 = \text{Max}(900 - 925, 0) - 20 = -20$$

46. A portfolio manager is reviewing trades in a 6-year US Treasury note with a 4% coupon and a 5-year US Treasury note futures contract maturing 3 months from today. The manager is deciding whether to buy the futures contracts or to buy call options on the futures contract with a strike price of USD 110 and maturity of 3 months. Using the information in the following table, and assuming the 6-year par rate is 1.75%, which of the following is correct regarding the durations for the futures contracts and call options?

6-Year Par Rate	Futures Contract Price(USD)	Call Option Price(USD)
1.70%	110.08	1.92
1.75%	109.70	1.72
1.80%	109.30	1.57
1.85%	108.90	1.38

- A. The futures contract duration is significantly longer than the call option duration.
- B. The futures contract duration is significantly shorter than the call option duration.
- C. The futures contract duration and the call option duration are essentially equal.
- D. Both the futures contract duration and the call option are negative.

Answer: B

$$\text{Futures duration} = \frac{110.08 - 109.30}{2 \times 109.70 \times 0.05\%} \approx 7$$

$$\text{call duration} = \frac{1.92 - 1.57}{2 \times 1.72 \times 0.05\%} \approx 203$$

47. In the event that a clearinghouse member is unable to make good on its side of a transaction with another clearinghouse member, the clearinghouse will resort to a number of measures to ensure that contracts executed among members are made good. Which of the following presents the preferred method followed by clearinghouse?

- A. Under-margined positions at the defaulting member firm are liquidated along with all of the member's proprietary positions and if that is insufficient, the defaulting firm's membership may be sold and its deposit liquidated.
- B. The member's deposit is liquidated and if that is insufficient, the clearinghouse draws down on a credit facility at a pre-designated bank, the cost of which is borne equally by all members of the exchange.
- C. The member 's deposit is liquidated and, if necessary, other member's deposits are liquidated on an equal percentage basis; If that is insufficient, the clearinghouse then draws down on a credit facility.
- D. The clearinghouse has a credit facility at a pre-designated bank that allows it to make good on all contracts, the cost of which is allocated across all members of the exchange using a weighting scheme based on the outstanding positions held by the member.

Answer: A

In the event a clearinghouse member is unable to meet its financial obligations on its open contracts, as has happened on various occasions throughout history, the following procedure generally is followed:

- All open and fully margined customer positions on the failed member's book are transferred to a solvent clearinghouse member. Under-margined customer positions and the firm's proprietary positions are liquidated.
- If, as a result of this liquidation, the member's customer account with the clearinghouse is in deficit, any remaining margin the member had deposited at the clearinghouse is applied toward the deficit on customer positions.
- If the failed member's margin deposits on hand are not sufficient, his exchange membership may be sold and his contribution to the clearinghouse guaranty fund may be used.
- If the member's account is still in deficit, the surplus fund of the clearinghouse, if any, may then be drawn upon at the discretion of the clearinghouse board.
- If necessary, further recourse can be made to the contributions of other clearinghouse

members to the guaranty fund.

- Finally, if necessary, a special assessment can be made against all remaining members of the clearinghouse; that is, the remaining members may be asked, by special pro-rata assessment, to make up any deficiency in the guaranty fund resulting from recourse to the preceding procedure.

48. A fund manager implements a delta-neutral strategy for an equity portfolio consisting of a long position in 1,250 shares of stock and a short position in call options with a delta of 0.5. Which of the following actions is necessary to maintain a delta-neutral portfolio if the delta of the call options changes from 0.5 to 0.65?

- Purchase an additional 250 shares of the stock
- Purchase an additional 300 shares of the stock
- Purchase an additional 375 shares of the stock
- Sell 300 shares of the stock

Answer: C

$$1,250 = N \times 0.5$$

$$N = 2,500$$

$$2,500 \times 0.65 = 1,625$$

Purchase an additional 375 shares of the stock



49. An analyst is using recent prepayment information from a mortgage pool to update a prepayment model for a USD 100 million pool of 30-year residential mortgage loans that currently has a USD 90 million balance. The scheduled principal payments for this month are total USD 150,000, but the pool received a total of USD 350,000 in principal payments. Assuming that this monthly rate of prepayment continues, what is the conditional prepayment rate?

- 2.20%
- 2.37%
- 2.63%
- 4.57%

Answer: C

$$\text{Monthly rate of prepayment} = (350,000 - 150,000) / (90,000,000 - 150,000) = 0.0022$$

$$\text{Conditional prepayment rate} = 1 - (1 - 0.0022)^{12} = 2.63\%$$

50. A US based automobile dealer enters into a foreign exchange contract to hedge an obligation of EUR 1 million payable in 3 months. The dealer received the following quotes from a large international bank (quotes are USD per EUR).

	Bid	Offer
Spot	1.19	1.21
3-month forward	1.25	1.27

Assuming the dealer fully hedges the obligation, what is the payoff on the hedge, using the 3-month forward, if the spot rate ends up at USD 1.23 per EUR three months from now?

- A. USD -40,000
- B. USD -20,000
- C. USD 20,000
- D. USD 40,000

Answer: A

The dealer needs to hedge an obligation of EUR 1 million payable in 3 months. It should long forward contract to hedge with 1.27 offer price.

The payoff is: $(1.23 - 1.27) \times 1 \text{ m} = -40,000$

51. The Black-Scholes-Merton model assumes that:

- A. Only long positions can be taken in securities.
- B. Translation costs must be proportional to the price of the underlying security.
- C. Securities are perfectly divisible.
- D. The underlying security's price follows a normal distribution.

Answer: C

The assumptions we use to derive the Black-Scholes-Merton differential equation are as follows:

- The stock price follows the process with μ and σ constant.
- The short selling of securities with full use of proceeds is permitted.
- There are no transaction costs or taxes. All securities are perfectly divisible.
- There are no dividends during the life of the derivative.
- There are no riskless arbitrage opportunities.
- Security trading is continuous.

- The risk-free rate of interest, r , is constant and the same for all maturities.
52. Consider a 1-year European call option with an exercise price of EUR 70. The price of the underlying non-dividend-paying stock is EUR 75 and the annual risk-free rate is 4%. The following estimates have been made:
- Black-Scholes-Merton model $N(d_1) = 45\%$
 - Risk-neutral probability of not exercising the call option at maturity = 63%
- Which of the following is closest to the price if the call option?
- A. EUR 8.87
B. EUR 9.89
C. EUR 10.75
D. EUR 12.32

Answer: A

Risk-neutral probability of exercising the call option = $N(d_2) = 1 - 63\% = 37\%$

$$c = S N(d_1) - Ke^{-rt} N(d_2) = 75 \times 45\% - 70 \times e^{-4\% \times 1} \times 37\% = 8.87$$

53. The treasurer of a US company has entered into a fixed-for-fixed currency swap with a German counterparty. The treasurer expects to pay EUR 100,000 and receive USD 120,000 at the end of each year for the next 4 years. Concerned that interest rates in the US will decrease, the treasurer opens an account with a local bank that pays a guaranteed nominal rate of 3%, compounded monthly. If the treasurer makes four annual end-of-year deposits of USD 120,000 each, what will the account balance be closest to at the end of the fourth year?
- A. USD 502,035
B. USD 502,347
C. USD 509,312
D. USD 6,111,745

Answer: B

$$(1 + 3\%/12)^{12} = 1 + R_{\text{annually}}$$

$$R_{\text{annually}} = 3.04\%$$

$$N = 4, I/Y = 3.04, PV = 0, PMT = -120,000, CPT FV = 502,347$$

54. A US manufacturer is planning to receive a cash inflow of KRW 50 billion as an initial payment from a South Korean customer in 3 months. The manufacturer's CFO is concerned that since all of its expenses are in USD, a drop in the value of the KRW will reduce the profitability of the

project. The manufacturer would like to choose a hedging strategy which can protect against some of the downside risk but allow the company to benefit from a KRW appreciation over the next 3 months. Which of the following is the most appropriate course of action?

- A. Long KRW futures contracts
- B. Short KRW futures contracts
- C. Long KRW call options
- D. Long KRW put options

Answer: D

55. A metals trader is considering establishing a reverse cash and carry trade by shorting silver today and simultaneously buying silver 1-year forward. The current spot price for silver is GBP 10.00 per troy ounce and the 1-year forward price is GBP 10.25 per troy ounce. On a 1-year cash investment the trader can earn an interest rate of 4%. What is the implied market lease rate?

- A. The metals trader will pay GBP 0.15 per troy ounce.
- B. The metals trader will receive GBP 0.15 per troy ounce.
- C. The metals trader will pay GBP 0.40 per troy ounce.
- D. The metals trader will receive GBP 0.40 per troy ounce.

Answer: A

$$\begin{aligned} F_0 &= S_0 \times (1 + R_f) - LR \\ 10.25 &= 10 \times (1 + 4\%) - LR \\ LR &= 0.15 \end{aligned}$$

56. A portfolio worth USD 20 million has a beta relative to the S&P 500 index of 0.75. The S&P 500 index is currently trading at 2,000 and 3-month S&P futures, with a contract size of USD 250×S&P 500 index are trading at 2,060. Using the 3-month futures contract, which of the following is the correct trade to increase the portfolio's beta to 1.78?

- A. Buy 40 futures contracts
- B. Sell 40 futures contracts
- C. Buy 69 futures contracts
- D. Sell 69 futures contracts

Answer: A

$$N = \frac{(1.78 - 0.75) \times 20M}{2060 \times 250} = 40$$

57. An interest rate analyst at a fund has obtained a table of USD interest rate swap rates as of today:

Term (Years)	Annualized Swap Rate
0.5	0.695%
1.0	0.905%
1.5	1.035%

Given this data, what is the semi-annually compounded 1.5-year spot rate, expressed as an annual rate?

- A. 0.88%
- B. 1.04%
- C. 2.08%
- D. 3.13%

Answer: B

58. A portfolio manager has a position in the stock of a company and would like to use options on the stock to construct a portfolio that is both delta and gamma neutral. Using puts and calls of differing strike prices and maturities, what is the minimum number of option positions needed to construct such a portfolio?

- A. 1
- B. 2
- C. 3
- D. Cannot be determined

Answer: B

先消掉二阶，再一阶。

59. An investor believes that the price of a stock, currently trading at USD 112, will increase by 10% over the next 3 months. Three-month American call and put options with a strike price of USD 110 are trading at USD 7 and USD 5 respectively.

The investor has USD 560,000 to invest and is looking for a return greater than the expected

increase in the stock price but wants to limit losses to the initial investment. Which of the following best describes the investor's strategy and total profit (ignoring taxes, transactions cost and the effect of discounting) if the stock ends up at USD 115 per share at option expiration?

- A. Buy 112,000 put options resulting in a net loss of USD 560,000
- B. Buy 80,000 call options resulting in a net loss of USD 160,000
- C. Buy 5,000 shares resulting in a net gain of USD 15,000
- D. Short 80,000 call options resulting in a net gain of USD 160,000

Answer: B

The expected increase of the stock is $112 \times 10\% = 11.2$

The stock's price is expected to increase, so the investor will buy call $560,000 / 7 = 80,000$ option.

$80,000 \times (115 - 110) - 560,000 = -160,000$, so the investor will have a loss of 160,000.

60. A firm that uses 5,000 barrels of oil each month implements a stack and roll hedge to protect against an increase in the price of oil. Assuming the firm wants to hedge its price exposure on the full 5,000 barrels of oil used each month, which of the following scenarios makes the stack and roll strategy unattractive compared to a hedging strategy of buying a series of futures contracts of different maturities?

- A. A decrease in the storage costs of crude oil
- B. A decrease in short-term interest rates
- C. A decrease in the firm's use of oil
- D. A steepening of the forward curve of crude oil futures

Answer: D

61. A trader holds a 1-year American put option with a strike price of USD 100 on a stock currently trading at USD 90. To value the option, a 1-step binomial tree is used where the stock price can move up or down by USD 10 over a 1-year period.

If the risk-neutral probability of the stock moving up is 81% and the risk-free rate is 6% per year, what is the current value of the American put?

- A. USD 1.79
- B. USD 1.90
- C. USD 7.63
- D. USD 10.00

Answer: D

90	81%	90+10=100	Value=100-100=0
	(1-81%)=19%	90-10=80	Value=100-80=20

$$f = [81\% \times 0 + 19\% \times 20] e^{-6\% \times 1} = 3.58$$

So the option will exercise early and have a value of 100-90=10.

62. A bank is earning just 1% on its EUR denominated assets. Seeking a higher return, the bank's loan officer converts EUR 150 million into USD at the spot exchange rate of USD 1.18 per EUR and makes a 1-year USD loan at a rate of 4%.

The officer realized that this transaction leaves the bank exposed to changes in the USD/EUR exchange rate and establishes a hedge by selling forward the USD loan proceeds, using the 1-year forward rate of USD 1.16 per EUR. Assuming no default, what rate of return in EUR terms has the lending officer locked in on the loan?

- A. 2.2%
- B. 2.7%
- C. 4.0%
- D. 5.8%

**Answer: D**

$$\frac{\frac{150 \times 1.18 \times (1+4\%)}{1.16} - 150}{150} = 5.8\%$$

63. During the first hour of trading on an exchange, the share price of a stock increased from USD 75.00 to USD 75.30. If the price of a call option on the stock decreased from USD 1.50 to USD 1.25 during the same trading period, which of the following could best explain why?
- A. The delta of the call option is negative.
 - B. The risk-free rate increased based on the previous day's aftermarket announcement by the Federal Reserve.
 - C. The implied volatility of the stock decreased during the first hour of trading.
 - D. The call option is deep in-the-money.

Answer: C

64. A firm has entered into a 1-year fixed-for-fixed currency swap receiving USD semiannually and paying EUR annually. The USD leg has a notional value of USD 10,000,000 and an annual coupon of 1.5%. The EUR leg has a value of EUR 8,080,808 and an annual coupon of 0.5%. Given the following discount and forward rates, what is the present value in USD of the swap on December 15, 2015?

Pay Date	USD/EUR Forward Rate	USD Discount Curve
June 15, 2016	1.240	0.9975
December 15, 2016	1.245	0.9950

- A. -11,080
- B. -10,893
- C. 38,896
- D. 39,083

Answer: D

$$PV(\text{USD}) = \left(10,000,000 \times \frac{1.5\%}{2}\right) \times 0.9975 + \left(10,000,000 \times \frac{1.5\%}{2} + 10,000,000\right)$$

$$= 10,099,437$$

$$PV(\text{EUR}) = 8,080,808 \times (1 + 0.5\%) \times 1.245 \times 0.9950$$

$$= 10,060,354$$

$$10,099,437 - 10,060,354 = 39083$$

65. Two traders are considering purchasing a European call option on a non-dividend paying stock with an annual volatility of 35%. The traders have different views on the underlying stock's future performance:

- Trader A thinks the stock price will increase by 6% over the next year.
- Trader B thinks the stock price will increase by 12% over the next year.

Both traders will price the option using a binomial tree, with each time step equal to 1 month. The option expires in 1 year and the risk-free rate is 2% per year. What will each trader use in their respective models for the risk-neutral probability of a downward movement in the stock price over the first time step?

- A. Trader A will use 50.00% and Trader B will use 40.81%.

- B. Trader A will use 50.05% and Trader B will use 59.19%.
- C. Both traders will use 51.7%.
- D. Both traders will use 55.84%.

Answer: C

$$u = e^{\sigma\sqrt{t}} = e^{35\%\sqrt{\frac{1}{12}}} = 1.106$$

$$d = \frac{1}{u} = 0.9039$$

$$p = \frac{e^{rt} - d}{u - d} = \frac{e^{2\% * \frac{1}{12}} - 0.9030}{1.106 - 0.9039} = 48.3\%$$

$$1 - p = 51.7\%$$

66. A trader shorted a publicly traded stock at USD 112 per share in anticipation of a significant drop in price. Since establishing this position, however, the stock price has increased to USD 125 per share. If the price continues to increase, which of the following orders would be appropriate to limit further losses on this trade?
- A. A stop order to buy at USD 127
 - B. A stop order to sell at USD 115
 - C. A limit order to buy at USD 100
 - D. A limit order to buy at USD 127

Answer: A

Stop loss (buy) orders are used to prevent further losses. When the stock price continues to rise to USD 127, the stop loss buy order is triggered and the short position is therefore terminated. The loss is capped to $127 - 112 = \text{USD } 15$.

67. A forward contract to buy a coupon bearing bond is priced at USD 910 and matures in 1 year. The underlying is a bond, with a USD 1,000 par value and a 6% annual coupon, which matures in 18 months. The bond is currently priced at USD 950. Coupons are paid semi-annually and the next coupon payment is in 6 months. Assuming the risk-free rates in the table below, is the forward contract mispriced and, if so, what is the correct price?

Term	Risk-free Rate
6-month	3.0%
12-month	4.0%
18-month	5.0%

- A. Yes, the forward price should be USD 857.
- B. Yes, the forward price should be USD 899.
- C. Yes, the forward price should be USD 928.
- D. No, the forward price is correct at USD 910.

Answer: C

$$1000 \times 6\% / 2 = 30$$

$$F = [950 - \frac{30}{1 + \frac{3\%}{2}} - \frac{30}{\left(1 + \frac{4\%}{2}\right)^2}] \times \left(1 + \frac{4\%}{2}\right)^2 = 927.63$$

68. A US trading company is evaluating alternatives for handing profits it has earned in Venezuela, denominated in VEF, where currency controls make converting earning into its home currency (USD) difficult. It can use its VEF currency, the equivalent of USD 50 million, to buy 1.5 million barrels of oil and sell half at EUR 32 per barrel and half at CHF 35 per barrel. The EUR/USD exchange rate is EUR 1 = USD 1.2 and the USD/CHF exchange rate is USD 1 = CHF 1.05. What is the profit or loss in USD if the firm undertakes this transaction?

- A. -5,000,000
- B. -2,437,500
- C. 3,800,000
- D. 6,362,500

Answer: C

$$32 * 750,000 * 1.2 + 35 * 750,000 / 1.05 - 50,000,000 = 3,800,000.$$

69. The risk manager for a large manufacturing company has identified the volatility of foreign exchange rates as the biggest driver of earnings uncertainty and would like to hedge some of that risk by taking a long position in either futures or a forward contract. In comparing these two alternatives which of the following is correct?
- A. To minimize the credit risk in the hedge, a forward contract with a local bank be used.

- B. If delivery needs to be made on one particular day, a futures contract with a local bank should be used.
- C. If a specific amount of currency is needed, a futures contract should be used.
- D. If the firm would prefer settlement at the end of the contract, a futures contract should be used.

Answer: B

The forward contract has a higher credit risk than futures contract. Thus A is wrong. The amount of futures contract is fixed and standardized, the amount of forward contract is customized, so if a specific amount of currency is needed, a forward contract should be used. The futures contract has a daily settlement, the forward contract is settled at the end of the contract, so D is wrong.

70. For which of the following derivative instruments would the delta-normal method for calculating VaR yield the least reliable result?

- A. An at-the-money straddle with European options on a stock
- B. A forward contract on a foreign currency with a net present value of zero
- C. A put option on a corporate bond priced at par with a redemption price above par
- D. A call option on a corporate bond priced at par with a redemption price below par

Answer: A

An at-the-money option has the highest gamma; thus the delta-normal method is the least reliable result.

71. Assume that it is March 1st in a year which is not a leap year. Calculate the dirty price of a US Treasury bond currently quoted at 98-16, with a 5% coupon paid semi-annually, maturing on February 28th in the following year. (Note that there are 181 actual days between February 28th and August 28th in a non-leap year; the 30-day convention would use 180 days for the same period.)

- A. 98.174
- B. 98.202
- C. 98.514
- D. 98.542

Answer: C

72. An investor has opened an account with a futures broker at a clearinghouse member firm and has purchased several positions in interest rate futures. What will the broker do each day in regard to this account?
- A. Observe the daily settlement prices, calculate a guaranty deposit and require an increase in margin if the newly measured guaranty deposit is greater than the one currently in place.
 - B. Observe the daily settlement prices, calculate a valuation margin and require an increase in margin if the newly measured valuation margin is greater than the margin currently on deposit.
 - C. Observe the daily settlement prices, calculate a new valuation margin and require this new margin to be posted.
 - D. Observe the last quotations, calculate a guaranty deposit based on these quotations and require an increase in the deposit held if it is greater than that currently held.

Answer: C

Valuation and Risk Models

73. Rating agencies originally operated a subscriber-pay model, where investors subscribed to rating reports. As their influence grew, the agencies changed their business model to issuer-pay, in which the issuers pay the agencies. Which of the following statements best describes the biggest concern that has arisen as a result of this change of business model?
- A. Regulators have been more reluctant to incorporate ratings into regulation, which has complicated the regulatory process.
 - B. The new model has resulted in a “free-rider” effect, in which the subscribers who use the ratings do not have to pay for them.
 - C. The new model gave rise to a perceived conflict of interest, in which the agencies were evaluating their own clients.
 - D. The agencies no longer tailored their offerings to different investor types, since investors were no longer paying them.

Answer: C

Rating agencies typically receive payment from issuers for their rating services. The issuer-pay model is sometimes questioned as having the potential to distort the independence of the rating process.

74. Consider a USD 1000 face value US Treasury bond with 1.5 years to maturity and an annualized

coupon rate of 4.5%, paid semi-annually. If the annualized yield-to-maturity of the bond today is 4.0%, what is the best estimate of the present value of the bond?

- A. USD 943.00
- B. USD 951.40
- C. USD 1007.20
- D. USD 1013.90

Answer: C

$N = 3, I/Y = 4/2 = 2, PMT = 1000 \times 4.5\% / 2 = 22.5, FV = 1000$

CPT: PV = 1,007.20

75. The manager of a derivatives portfolio wishes to estimate the VaR of the portfolio. When evaluating the delta-normal approach and the full revaluation approach for VaR estimation, which of the following statements is correct?

- A. The delta-normal approach is more accurate than the full revaluation approach when applied to complex derivatives.
- B. Both the full revaluation approach and the delta-normal approach assume that asset prices are normally distributed.
- C. The full revaluation approach does not require estimating the VaR of the underlying assets whereas the delta-normal approach does.
- D. The delta-normal approach is less computationally intensive than full revaluation approach.

Answer: D

According to “Putting VaR to Work” in Valuation and Risk Models, the full revaluation approach uses a valuation expression to price the derivative at the VaR tail of the underlying factor. This approach has the great advantage of accuracy. It does not involve any approximations. However, this approach can be computationally very burdensome.

The delta-normal approach involves the delta approximation, or the delta-gamma approximation. The approach is known as “delta-normal” because the linear approximation is often used in conjunction with a normality assumption for the distribution of fluctuations in the underlying factor value. The approach can be implemented relatively simply.

76. For any portfolio P, let $VaR(P, \lambda, t)$ denote the VaR, and $ES(P, \lambda, t)$ denote the ES, with confidence level λ over a horizon of t days. Which of the following relationships is always true?
- A. $ES(P, \lambda, t) \leq VaR(P, \lambda, t)$
 - B. $VaR(P_1 + P_2, \lambda, t) \leq VaR(P_1, \lambda, t) + VaR(P_2, \lambda, t)$

- C. $ES(3\times P, \lambda, t) = 3\times ES(P, \lambda, t)$
- D. $VaR(3\times P, \lambda, t) = 9\times VaR(P, \lambda, t)$

Answer: C

According to “Measures of Financial Risk” in Valuation and Risk Models, a risk measure is said to be coherent if it satisfies the following properties:

- Monotonicity: $Y \geq X \rightarrow \rho(Y) \leq \rho(X)$
- Subadditivity: $\rho(X + Y) \leq \rho(X) + \rho(Y)$
- Positive homogeneity: $\rho(hX) = h\rho(X)$ for $h > 0$
- Translational invariance: $\rho(X + n) = \rho(X) - n$ for some certain amount n .

VaR is not coherent as it is not subadditive, therefore B, D is not correct.

ES is the average of the worst $100(1 - \alpha\%)$ of losses. ES is coherent, therefore C is correct, A is not correct.

77. To Be Announced (TBA) trades are a subset of the MBS market. Which of the following statements most accurately characterizes the structure of the TBA market?
- A. TBAs are comprised of highly diverse securities thereby reducing the risk to investors.
 - B. The composition of a TBA is announced at the time the trade bids on it.
 - C. The TBA market is essentially a forward market in which buyer and seller agree to exchange a pool of securities for cash in the future.
 - D. There are actually two separate TBA markets, one for fixed rate agency pools and the other for conventional adjustable-rate mortgage pools.

Answer: C

TBA (To Be Announced) market is a forward market with a delivery option. Just as in the case of the delivery option in note and bond futures, the TBA seller will pick the cheapest-to-deliver (CTD) pool, that is, the pool that is worth the least subject to the issuer, maturity, and coupon requirements.

78. The Basel Committee has recommended several implementation principles for the governance of sound stress testing practices. One of the recommendations is that:
- A. Stress testing reports should not be passed up to senior management without first being approved by middle management.
 - B. Stress testing reports should have limited input from their respective business areas to prevent biasing of the results.
 - C. Stress testing reports should be separated by business lines to help identify risk concentrations.

- D. Stress testing reports should complement rather than replace the risk management tools used at the firm.

Answer: D

Valuation and Risk Models: "Principles for Sound Stress Testing Practices and Supervision"

79. As a bank becomes more concentrated in particular industry sectors, the default correlation among the loans it makes increases. Assuming a bank can secure loans with similar average default rates as it becomes more concentrated, which of the following is most likely to occur?
- A. The gap between the unexpected loss of the loan portfolio and the sum of the risk contributions of each loan increases.
 - B. The gap between the unexpected loss of the loan portfolio and the sum of the risk contributions of each loan decreases.
 - C. The expected loss of the loan portfolio increases.
 - D. The unexpected loss of the loan portfolio increases.

Answer: D

$$\begin{aligned}UL_P &= \sqrt{\sum_{i=1}^n \sum_{j=1}^n \omega_i \omega_j p_{ij} UL_i UL_j} \\ULC_i &= \frac{\sum_{j=1}^n UL_j p_{ij}}{UL_P} \cdot UL_i\end{aligned}$$



Sum of the ULCs of all loans will equal the portfolio-level UL.

80. An asset has a return distribution with fat tails. Assuming efficient markets, which of the following is the best explanation for fat tails in this distribution?
- A. The return series exhibits conditional normality with time-varying volatility.
 - B. The return series exhibits conditional normality with time-varying mean.
 - C. The return series exhibits unconditional normality with time-varying volatility.
 - D. The return series exhibits unconditional normality with time-varying mean.

Answer: C

81. All of the following should be classified as operational risk events except:
- A. A sale of a basket of securities is recorded as a purchase.

- B. A monthly volatility is used as input to a model that requires daily volatility as input.
- C. A trader generates large losses after taking positions that exceed trading limits.
- D. A loss is incurred because a portfolio manager relied on an analyst's optimistic forecast.

Answer: D

82. Which of the following methods is an example of a stress test that ignores the correlation among risk variables and examines the scenario in which all variables move in the direction that causes the greatest loss on the portfolio?
- A. Factor push method
 - B. Prospective scenario analysis method
 - C. Conditional scenario method
 - D. Event-driven method

Answer: A

Prospective scenario analysis method: represent hypothetical one-off surprises that are analyzed in terms of their repercussions on financial market. Factor push method and conditional scenarios analysis method are one type of prospective scenario analysis method.

Conditional scenario method: a systematic method to incorporate correlation across all variables consistently.

Factor Push Method: Some implementations of stress testing try to account for multidimensionality using a rough two-step procedure. First, push up and down all risk-factor variables individually, and then compute the changes to the portfolio. Second, evaluate a worst-case scenario, where all variables are pushed in the direction that creates the worst loss. This approach is very conservative but completely ignores correlations.

Event-driven method: the scenario is formulated from plausible events that generate movements in the risk factors.

83. Rating agencies do not provide all details about their rating methodologies. However, broadly speaking the agencies do follow similar processes. Which of the following statements regarding credit of firms most accurately reflects the agencies' methodologies?
- A. Debt issuer domiciled in a country with a sovereign rating of BBB will not likely be rated higher than an issuer domiciled in a country with a speculative rating.
 - B. Agencies generally avoid subjective elements when rating corporate debt, but subjective

- elements in the sovereign rating process are unavoidable.
- C. Rating agencies focus on the long-term horizon when evaluating sovereign entities but on the short term horizon when evaluating corporate entities.
 - D. The risk of the industry in which a firm operates will frequently place an upper boundary on a corporate rating.

Answer: B

“The Rating Agencies” in Financial Markets and Products

84. A model risk analyst at an asset management firm is reviewing a time series forecasting process.

The analyst wants to determine if the time series being forecast are covariance stationary.

Which of the following is a characteristic of a covariance stationary time series?

- A. The autocovariance function depends only on the time displacement, not on time itself.
- B. The mean of the series can vary over time as long as the autocorrelation structure remains constant.
- C. The autocovariance structure of the series must be constant.
- D. The mean of the series must be 0 and changes must be normally distributed.

Answer: C

If we want to forecast a series, at a minimum we'd like its mean and its covariance structure (i.e., the covariances between current and past values) to be stable over time, in which case we say that the series is covariance stationary.

The first requirement for a series to be covariance stationary is that the mean of the series be stable over time.

The second requirement for a series to be covariance stationary is that its covariance structure be stable over time. We quantifying stability of the covariance structure using the autocovariance function.

85. A risk manager is estimating the 1-day 95% ES on a domestic equity portfolio using the historical simulation approach with a 100-day look back period. The six most extreme negative returns over the look back period, along with the time they occurred, are:

Order	Return	Number of Days Ago
1	-10.00%	95
2	-6.30%	17

3	-4.70%	65
4	-4.00%	4
5	-3.80%	5
6	-3.60%	30

Over the next 10 days, the portfolio experienced four days of extreme negative return: -25.0%, -4.1%, -7.8% and -9.5%. On the other six days, the portfolio experienced positive returns. The risk manager must now update the previous ES estimate. Assuming the portfolio has a current value of USD 100 million, what is the updated 1-day 95% ES using the historical simulation approach?

- A. USD 4.7 million
- B. USD 10.7 million
- C. USD 11.7 million
- D. USD 25.0 million

Answer: B

With the new information given, we can get the new order of the extreme return as follow:

Order	Return
1	-25.00%
2	-9.50%
3	-7.80%
4	-6.30%
5	-4.70%
6	-4.10%

The 1-day 95% ES: $(-25\% - 9.5\% - 7.8\% - 6.3\% - 4.70\%) / 5 \times 100 \text{ m} = 10.7 \text{ m}$

86. A risk manager is measuring the VaR of a portfolio of investment securities for a regional bank.

The portfolio has a current market value of USD 10 million with a mean daily return of 0.25% and variance of daily returns of 0.05%. Assuming that the portfolio's daily returns follow a normal distribution. The estimated 1-day 95% VaR is closest to:

- A. USD 261,600.
- B. USD 286,600.
- C. USD 342,800.

- D. USD 367,800.

Answer: C

Volatility of daily returns = $\text{sqrt}(0.05\%) = 0.0224$

1-day 95% VaR = $|10(0.25\% - 1.645 \times 0.0224)| = 342,833$

87. S&P has recently analyzed the creditworthiness of a company to assign it an initial rating.

During the review the company was found to have adequate payment capacity currently, although a negative change in the business environment could affect its capacity for repayment. The company was given an investment grade rating. Which of the following is most likely the specific rating assigned?

- A. AA
- B. A
- C. BBB
- D. BB

Answer: C

The company was given an investment grade rating, so D is wrong.

AAA/Aaa	Highest quality; extremely strong, highly unlikely to be affected by foreseeable events.
AA/Aa	Very high quality; capacity for repayment is not significantly vulnerable to foreseeable events.
A/A	Strong payment capacity; more likely to be affected by changes in economic circumstances.
BBB/Baa	Adequate payment capacity; a negative change in environment may affect capacity for repayment.

88. A portfolio manager is estimating VaR on a stock portfolio using the implied volatility of at-the-money index options, derived from the Black-Scholes-Merton model. Which of the following statements regarding this approach is most accurate?

- A. The method is difficult to implement because different options must be used as the price of the index changes.
- B. Empirical research indicates that implied volatility is, on average, much lower than the realized volatility.
- C. Empirical research indicates that using implied volatility to measure expected volatility is less accurate than using historical volatility.

D. The model assumes a constant volatility rather than a stochastic, time-dependent volatility.

Answer: D

A big advantage of implied volatility is the forward-looking predictive nature of the model. The implied volatility model reacts immediately to changing market conditions. But its disadvantages include that the volatility parameter is assumed to be constant from time to time. Empirical results suggest implied volatility is on average greater than realized volatility.

89. A wealth management executive is responding to a client question about different kinds of bonds and the security they offer. The client has asked the executive to identify the least secure type of bond from among four different types of bonds. Assuming all the bonds have the same maturity and are from issuers with identical credit quality, which of the following is the executive most likely to identify as least secure?

- A. Debenture
- B. Equipment trust certificate
- C. Mortgage bond
- D. Subordinated bond

Answer: D

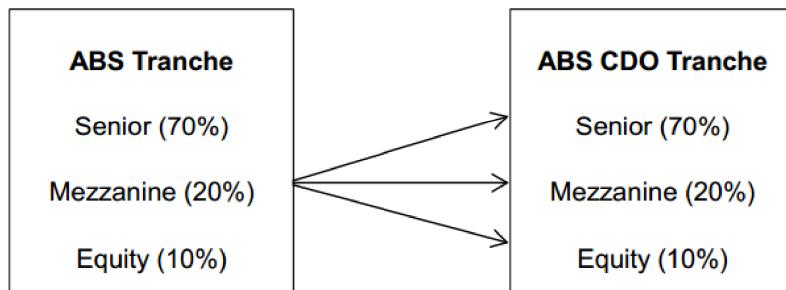
A mortgage bond is a bond backed by a pool of mortgages on a real estate asset.

Equipment trust certificates is a variation of a mortgage bond where a particular piece of equipment underlies the bond.

Debentures are unsecured bonds. But if the company is highly rated and has not issued any secured bonds, then the debentures are almost the equivalent of mortgage bonds.

Subordinated debenture bonds have a claim that is at the bottom of the list of creditors if the issuer goes into default.

90. A risk manager is seeking to understand the mechanics of ABS in order to better understand their role in the 2007 credit crisis. A pool of subprime mortgages that has been divided into three tranches to form an ABS is being reviewed. The mezzanine of the ABS has been further structured into an ABS CDO. The distribution of assets within the various tranches is as follows:



If the underlying subprime pool loses 20% of its principle value through default, what will the losses to the ABS CDO's equity, mezzanine and senior tranches, respectively, be?

- A. 75%, 50%, and 0%
- B. 100%, 75%, and 0%
- C. 100%, 100%, and 29%
- D. 100%, 100%, and 64%

Answer: C

ABS CDO: equity: $20\% * 10\% = 2\%$; mezzanine: $20\% * 20\% = 4\%$ and senior: $20\% * 70\% = 14\%$.

If the underlying subprime pool loses 20%, then ABS CDO loses $20\% - 10\%$ (equity) = 10%. ABS CDO's equity, mezzanine and senior tranches will loss $100\%, 100\%, (10\% - 2\% - 4\%) / 14\% = 29\%$.

91. An investor has financed a purchase of an MBS pool using a dollar roll valued at USD 10 million. The net proceeds of buying the January/February dollar roll are USD 133,000. The short-term (1-month) interest rate is 0.5%, and the expected total principal pay down is 1%. The current prices are in the table below.

FNMA 30-Year TBAs 4% coupon	
Settlement	Price (USD)
15-Jan	102.00
15-Feb	101.73

- If the February settlement price declined to USD 101.50, which of the following is true?
- A. The dollar roll is trading below carry and the proceeds are higher.
 - B. The dollar roll is trading below carry and the proceeds are lower.
 - C. The dollar roll is trading above carry and the proceeds are higher.
 - D. The dollar roll is trading above carry and the proceeds are lower.

Answer: C

92. A small bank's asset-liability committee has requested a report on the bank's sensitivity to interest rate risk. Currently the market value of the bank's liabilities is USD 200 million with a DV01 of USD 330,000, and the market value of the bank's assets is USD 220 million with a DV01 of USD 400,000. Which of the following correctly reports the bank's exposure to interest rate risk?
- The bank's equity will decrease by USD 70,000 for a parallel increase of 1% in the yield curve.
 - The bank's equity will increase by USD 70,000 for a parallel increase of 1% in the yield curve.
 - The effective duration of the bank's equity is -35.
 - The convexity of the bank's equity is -3,500.

Answer: C

The DV01 of the bank's equity = $400,000 - 330,000 = 70,000$. For a parallel increase of 1%, the bank's equity will decrease $70,000 \times 1\% = 700$.

$$\begin{aligned} D^E &= \frac{P_- - P_+}{2P_0 \Delta y} = \frac{(220M - 200M + 70,000) - (220M - 200M - 70,000)}{2(220M - 200M) \times 0.0001} \\ &= \frac{140,000}{2 \times 20M \times 0.0001} = 35 \end{aligned}$$

93. The following table gives the initial price of a 30-year C-STRIP and its present value after applying key rate 1-basis point shifts at 2, 5, 10, and 30 years.

	Initial Curve	2-Year Shift	5-Year Shift	10-Year Shift	30-Year Shift
Value	24.1234	24.4321	24.6642	24.8234	24.9523

What are key rate '01 and duration with respect to the 5-year shift?

- Key rate '01 equals -0.0035 and key rate duration equals -1.4570
- Key rate '01 equals -0.0410 and key rate duration equals -16.9200
- Key rate '01 equals -0.5408 and key rate duration equals -224.1807
- Key rate '01 equals -1.4570 and key rate duration equals -0.0035

Answer: C

With respect to the 5-year shift:

Key rate 01=24.1234-24.6642=-0.5408,

Key rate duration= DV01/(P₀*0.0001)=-0.5408/(24.1234*0.0001)=-224.1807.

94. Which of the following is a drawback of stress testing?

- A. Stress testing only considers scenarios that have never happened.
- B. Stress testing involves subjective decisions.
- C. Stress testing cannot account for correlation among assets.
- D. Stress testing cannot account for fat tails in return distributions.

Answer: B

95. The risk manager for an actively managed portfolio of stocks and bonds is analyzing the various types of risk exposures of the portfolio. Which of the following would be an example of “curve” risk?

- A. Long and short positions with different maturities are hedged against a parallel shift in the term structure of interest rates but not against a non-parallel shift.
- B. The portfolio has long positions in short-term corporate bonds and there has been a steady rise in corporate bankruptcies.
- C. The portfolio has a large position in demotic stocks for which volatility has been substantially increasing.
- D. The fixed income portfolio is net long domestic bonds and net short foreign bonds while domestic interest rates have been rising.

Answer: A

96. An investor in MBS is evaluating two methods of financing a recent purchase of an MBS pool.

One method involves entering into a repurchase agreement (repo) and selling the pool now. The other method involves purchasing a dollar roll. One advantage of purchasing a roll instead of entering into a repo agreement is that roll buyers:

- A. Receive the same securities back when the transaction is concluded.
- B. Receive the interest and principal repayments on the pool during the life of the roll.
- C. Are more similar to a secured borrower than a repo participant.
- D. Are subject to less risk of prepayment than a repo buyer.

Answer: D

97. A new hire in the credit risk department of a bank is reviewing the bank's internal 1-year default score transaction matrix given by:

Next year's score	Current score		
	1	2	3
1	40%	30%	0%
2	30%	30%	20%
3	20%	20%	40%
Default	10%	20%	40%

Which of the following is the best reason to conclude that the firm uses a point-in-time, rather than a through-the-cycle, scoring methodology?

- A. Internal scoring models are almost always point-in-time.
- B. The diagonal of the matrix has relatively low transition probabilities.
- C. The rows of the matrix never add up to 100%.
- D. The columns of the matrix always add up to 100%.

Answer: B

98. A risk manager is analyzing the following US Treasury note position held by a bond trading desk:

Amount	USD 100 million face value
Structure	Option-less, semi-annual coupons, full par at maturity
Coupon Rate	4%, paid semi-annually
Maturity	3 years from today
Yield-to-maturity	5%

Ignoring the impact of convexity, what will the approximate decrease in the value of the position be if the US Treasury yield curve shifts upward by 10 bps?

- A. USD 270,300
- B. USD 280,000
- C. USD 288,000
- D. USD 294,000

Answer: A

$$N = 6, I/Y = 5 / 2 = 2.5, PMT = 100M \times 4\% / 2 = 2M, FV = 100M, PV_0 = -97.2459M$$

$$N = 6, I/Y = (5 + 0.1) / 2 = 2.55, PMT = 100M \times 4\% / 2 = 2M, FV = 100M, PV_+ = -96.9756M$$

$$97.2459M - 96.9756M = 270,300$$

99. A risk consultant is reviewing the role of regulatory arbitrage in the 2007 credit crisis to better understand the lessons learned as a result of the crisis. Which of the following best describes how regulatory arbitrage took place in the mortgage securitization market?

- A. Banks securitized mortgages and then invested in tranches of these MBS to get a more favorable treatment for capital purposes.
- B. Mortgage originators were required to purchase a portion of MBS equity tranches, which were then offered in the secondary market.
- C. Pension funds which invested in mortgage securities were required to hold only securities rated BBB and above.
- D. Mortgage originators were encouraged to offer adjustable rate mortgages to subprime borrowers with initial low “teaser” rates.

Answer: A

100. An oil exploration company has a USD 250 million line of credit with a multinational bank, of which USD 100 million has already been drawn. The bank wants to compute an appropriate loan loss reserve for this position. The bank's internal credit risk model assigns the loan a 1-year default probability of 0.40% and expects an exposure amount of USD 220 million given default. The loss given default is estimated to be 60% with a standard deviation of 25%. What is the estimated unexpected loss of this loan?

- A. USD 528,000
- B. USD 9,029,000
- C. USD 11,305,000
- D. USD 52,800,000

Answer: B

$$\begin{aligned} UL &= EA \times \sqrt{PD \times \sigma_{LR}^2 + LR^2 \times \sigma_{PD}^2} \\ &= 220M \times \sqrt{0.4\% \times (25\%)^2 + (60\%)^2 \times 0.4\% \times 99.6\%} \\ &= 9,029,000 \end{aligned}$$