FRM®
PART I
PRACTICE EXAM 1

2023 EDITION

25 YEARS

GARP®

FRM® | Financial Risk Manager

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Introduction

The FRM Exam is a practice-oriented examination. Its questions are derived from a combination of theory, as set forth in the core readings, and "real-world" work experience. Candidates are expected to understand risk management concepts and approaches and how they would apply to a risk manager's day-to-day activities.

The FRM Exam is also a comprehensive examination, testing a risk professional on a number of risk management concepts and approaches. It is very rare that a risk manager will be faced with an issue that can immediately be slotted into one category. In the real world, a risk manager must be able to identify any number of risk-related issues and be able to deal with them effectively.

The 2023 FRM Part I Practice Exam #1 and #2 have been developed to aid candidates in their preparation for the FRM Exam in May and November 2023. These Practice Exams are based on a sample of questions from prior FRM Exams and are suggestive of the questions that will be on the 2023 FRM Exam.

The 2023 FRM Part I Practice Exam #1 contains 100 multiple-choice questions, the same number of questions that the actual 2023 FRM Exam Part I will contain. As such, this Practice Exam was designed to allow candidates to calibrate their preparedness both in terms of material and time.

The 2023 FRM Practice Exams do not necessarily cover all topics to be tested in the 2023 FRM Exam as any test samples from the universe of testable possible knowledge points. However, the questions selected for inclusion in the Practice Exams were chosen to be broadly reflective of the material assigned for 2023 as well as to represent the style of question that the FRM Committee considers appropriate based on assigned material.

For a complete list of current topics, core readings, and key learning objectives, candidates should refer to the 2023 FRM Exam Study Guide and 2023 FRM Learning Objectives.

Core readings were selected by the FRM Committee to assist candidates in their review of the subjects covered by the Exam. Questions for the FRM Exam are derived from the core readings. It is strongly suggested that candidates study these readings in depth prior to sitting for the Exam.

Suggested Use of Practice Exams:

To maximize the effectiveness of the practice exams, candidates are encouraged to follow these recommendations:

1. Plan a date and time to take the practice exam.
   - Set dates appropriately to give sufficient study/review time for the practice exam prior to the actual exam.

2. Simulate the test environment as closely as possible.
   - Take the practice exam in a quiet place.
   - Have only the practice exam, candidate answer sheet, calculator, and writing instruments (pencils, erasers) available.
   - Minimize possible distractions from other people, cell phones, televisions, etc.; put away any study material before beginning the practice exam.
   - Allocate 4 hours to complete FRM Part I Practice Exam and 4 hours to complete FRM Part II Practice Exam and keep track of your time. The actual FRM Exam Part I and FRM Exam Part II are 4 hours each.
   - Complete the entire exam and answer all questions. Points are awarded for correct answers. There is no penalty on the FRM Exam for an incorrect answer.
   - Follow the FRM calculator policy. Candidates are only allowed to bring certain types of calculators into the exam room. The only calculators authorized for use on the FRM Exam in 2023 are listed below; there will be no exceptions to this policy. You will not be allowed into the exam room with a personal calculator other than the following: Texas Instruments BA II Plus (including the BA II Plus Professional), Hewlett Packard 12C (including the HP 12C Platinum and the Anniversary Edition), Hewlett Packard 10B II, Hewlett Packard 10B II+ and Hewlett Packard 20B.

3. After completing the FRM Practice Exams
   - Calculate your score by comparing your answer sheet with the practice exam answer key.
   - Use the practice exam Answers and Explanations to better understand the correct and incorrect answers and to identify topics that require additional review. Consult referenced core readings to prepare for the exam.
   - Remember: pass/fail status for the actual exam is based on the distribution of scores from all candidates, so use your scores only to gauge your own progress and level of preparedness.

Reference Table: Let Z be a standard normal random variable.

z	P(Z<z)	z	P(Z<z)	z	P(Z<z)	z	P(Z<z)	z	P(Z<z)	z	P(Z<z)
-3	0.0013	-2.50	0.0062	-2.00	0.0228	-1.50	0.0668	-1.00	0.1587	-0.50	0.3085
-2.99	0.0014	-2.49	0.0064	-1.99	0.0233	-1.49	0.0681	-0.99	0.1611	-0.49	0.3121
-2.98	0.0014	-2.48	0.0066	-1.98	0.0239	-1.48	0.0694	-0.98	0.1635	-0.48	0.3156
-2.97	0.0015	-2.47	0.0068	-1.97	0.0244	-1.47	0.0708	-0.97	0.1660	-0.47	0.3192
-2.96	0.0015	-2.46	0.0069	-1.96	0.0250	-1.46	0.0721	-0.96	0.1685	-0.46	0.3228
-2.95	0.0016	-2.45	0.0071	-1.95	0.0256	-1.45	0.0735	-0.95	0.1711	-0.45	0.3264
-2.94	0.0016	-2.44	0.0073	-1.94	0.0262	-1.44	0.0749	-0.94	0.1736	-0.44	0.3300
-2.93	0.0017	-2.43	0.0075	-1.93	0.0268	-1.43	0.0764	-0.93	0.1762	-0.43	0.3336
-2.92	0.0018	-2.42	0.0078	-1.92	0.0274	-1.42	0.0778	-0.92	0.1788	-0.42	0.3372
-2.91	0.0018	-2.41	0.0080	-1.91	0.0281	-1.41	0.0793	-0.91	0.1814	-0.41	0.3409
-2.9	0.0019	-2.40	0.0082	-1.90	0.0287	-1.40	0.0808	-0.90	0.1841	-0.40	0.3446
-2.89	0.0019	-2.39	0.0084	-1.89	0.0294	-1.39	0.0823	-0.89	0.1867	-0.39	0.3483
-2.88	0.0020	-2.38	0.0087	-1.88	0.0301	-1.38	0.0838	-0.88	0.1894	-0.38	0.3520
-2.87	0.0021	-2.37	0.0089	-1.87	0.0307	-1.37	0.0853	-0.87	0.1922	-0.37	0.3557
-2.86	0.0021	-2.36	0.0091	-1.86	0.0314	-1.36	0.0869	-0.86	0.1949	-0.36	0.3594
-2.85	0.0022	-2.35	0.0094	-1.85	0.0322	-1.35	0.0885	-0.85	0.1977	-0.35	0.3632
-2.84	0.0023	-2.34	0.0096	-1.84	0.0329	-1.34	0.0901	-0.84	0.2005	-0.34	0.3669
-2.83	0.0023	-2.33	0.0099	-1.83	0.0336	-1.33	0.0918	-0.83	0.2033	-0.33	0.3707
-2.82	0.0024	-2.32	0.0102	-1.82	0.0344	-1.32	0.0934	-0.82	0.2061	-0.32	0.3745
-2.81	0.0025	-2.31	0.0104	-1.81	0.0351	-1.31	0.0951	-0.81	0.2090	-0.31	0.3783
-2.8	0.0026	-2.30	0.0107	-1.80	0.0359	-1.30	0.0968	-0.80	0.2119	-0.30	0.3821
-2.79	0.0026	-2.29	0.0110	-1.79	0.0367	-1.29	0.0985	-0.79	0.2148	-0.29	0.3859
-2.78	0.0027	-2.28	0.0113	-1.78	0.0375	-1.28	0.1003	-0.78	0.2177	-0.28	0.3897
-2.77	0.0028	-2.27	0.0116	-1.77	0.0384	-1.27	0.1020	-0.77	0.2206	-0.27	0.3936
-2.76	0.0029	-2.26	0.0119	-1.76	0.0392	-1.26	0.1038	-0.76	0.2236	-0.26	0.3974
-2.75	0.0030	-2.25	0.0122	-1.75	0.0401	-1.25	0.1056	-0.75	0.2266	-0.25	0.4013
-2.74	0.0031	-2.24	0.0125	-1.74	0.0409	-1.24	0.1075	-0.74	0.2296	-0.24	0.4052
-2.73	0.0032	-2.23	0.0129	-1.73	0.0418	-1.23	0.1093	-0.73	0.2327	-0.23	0.4090
-2.72	0.0033	-2.22	0.0132	-1.72	0.0427	-1.22	0.1112	-0.72	0.2358	-0.22	0.4129
-2.71	0.0034	-2.21	0.0136	-1.71	0.0436	-1.21	0.1131	-0.71	0.2389	-0.21	0.4168
-2.7	0.0035	-2.20	0.0139	-1.70	0.0446	-1.20	0.1151	-0.70	0.2420	-0.20	0.4207
-2.69	0.0036	-2.19	0.0143	-1.69	0.0455	-1.19	0.1170	-0.69	0.2451	-0.19	0.4247
-2.68	0.0037	-2.18	0.0146	-1.68	0.0465	-1.18	0.1190	-0.68	0.2483	-0.18	0.4286
-2.67	0.0038	-2.17	0.0150	-1.67	0.0475	-1.17	0.1210	-0.67	0.2514	-0.17	0.4325
-2.66	0.0039	-2.16	0.0154	-1.66	0.0485	-1.16	0.1230	-0.66	0.2546	-0.16	0.4364
-2.65	0.0040	-2.15	0.0158	-1.65	0.0495	-1.15	0.1251	-0.65	0.2578	-0.15	0.4404
-2.64	0.0041	-2.14	0.0162	-1.64	0.0505	-1.14	0.1271	-0.64	0.2611	-0.14	0.4443
-2.63	0.0043	-2.13	0.0166	-1.63	0.0516	-1.13	0.1292	-0.63	0.2643	-0.13	0.4483
-2.62	0.0044	-2.12	0.0170	-1.62	0.0526	-1.12	0.1314	-0.62	0.2676	-0.12	0.4522
-2.61	0.0045	-2.11	0.0174	-1.61	0.0537	-1.11	0.1335	-0.61	0.2709	-0.11	0.4562
-2.6	0.0047	-2.10	0.0179	-1.60	0.0548	-1.10	0.1357	-0.60	0.2743	-0.10	0.4602
-2.59	0.0048	-2.09	0.0183	-1.59	0.0559	-1.09	0.1379	-0.59	0.2776	-0.09	0.4641
-2.58	0.0049	-2.08	0.0188	-1.58	0.0571	-1.08	0.1401	-0.58	0.2810	-0.08	0.4681
-2.57	0.0051	-2.07	0.0192	-1.57	0.0582	-1.07	0.1423	-0.57	0.2843	-0.07	0.4721
-2.56	0.0052	-2.06	0.0197	-1.56	0.0594	-1.06	0.1446	-0.56	0.2877	-0.06	0.4761
-2.55	0.0054	-2.05	0.0202	-1.55	0.0606	-1.05	0.1469	-0.55	0.2912	-0.05	0.4801
-2.54	0.0055	-2.04	0.0207	-1.54	0.0618	-1.04	0.1492	-0.54	0.2946	-0.04	0.4840
-2.53	0.0057	-2.03	0.0212	-1.53	0.0630	-1.03	0.1515	-0.53	0.2981	-0.03	0.4880
-2.52	0.0059	-2.02	0.0217	-1.52	0.0643	-1.02	0.1539	-0.52	0.3015	-0.02	0.4920
-2.51	0.0060	-2.01	0.0222	-1.51	0.0655	-1.01	0.1562	-0.51	0.3050	-0.01	0.4960

Special Instructions and Definitions

1. Unless otherwise indicated, interest rates are assumed to be continuously compounded.
2. Unless otherwise indicated, option contracts are assumed to be on one unit of the underlying asset.
3. bp(s) = basis point(s)
4. CAPM = capital asset pricing model
5. CCP = central counterparty or central clearing counterparty
6. CDO = collateralized debt obligation(s)
7. CDS = credit default swap(s)
8. CEO, CFO, CIO, and CRO are: chief executive, financial, investment, and risk officers, respectively
9. CVA = credit value adjustment
10. ERM = enterprise risk management
11. ES = expected shortfall
12. EWMA = exponentially weighted moving average
13. FX = foreign exchange
14. GARCH = generalized auto-regressive conditional heteroskedasticity
15. LIBOR = London interbank offered rate
16. MBS = mortgage-backed-security(securities)
17. OIS = overnight indexed swap
18. OTC = over-the-counter
19. RAROC = risk-adjusted return on capital
20. SOFR = secured overnight financing rate
21. VaR = value-at-risk

22. The following acronyms are used for selected currencies:

Acronym	Currency
AUD	Australian dollar
BRL	Brazilian real
CAD	Canadian dollar
CHF	Swiss franc
CNY	Chinese yuan
EUR	euro

Acronym	Currency
GBP	British pound sterling
HKD	Hong Kong dollar
INR	Indian rupee
JPY	Japanese yen
SGD	Singapore dollar
USD	US dollar

2023 FRM Part I Practice Exam #1 – Candidate Answer Sheet

1.		26.		51.		76.	
2.		27.		52.		77.	
3.		28.		53.		78.	
4.		29.		54.		79.	
5.		30.		55.		80.	
6.		31.		56.		81.	
7.		32.		57.		82.	
8.		33.		58.		83.	
9.		34.		59.		84.	
10.		35.		60.		85.	
11.		36.		61.		86.	
12.		37.		62.		87.	
13.		38.		63.		88.	
14.		39.		64.		89.	
15.		40.		65.		90.	
16.		41.		66.		91.	
17.		42.		67.		92.	
18.		43.		68.		93.	
19.		44.		69.		94.	
20.		45.		70.		95.	
21.		46.		71.		96.	
22.		47.		72.		97.	
23.		48.		73.		98.	
24.		49.		74.		99.	
25.		50.		75.		100.	

1. Question

The CFO and CRO at a French property-casualty insurer are discussing the impact recent flooding in Europe is having on their company. They are concerned about a surge in property insurance claims causing the company's regulatory capital to fall below the solvency capital requirement (SCR) prescribed under Solvency II. Which of the following would be a result of this situation?

A The company will be prevented from writing new property-casualty policies.

B A plan to bring capital above the minimum capital requirement must be formulated.

C The company can lower the capital charges assessed for determining the capital requirement by decreasing investment risk.

D A waiver of capital requirements can be granted by the French insurance regulator.

2. Question

A risk analyst at a hedge fund is conducting a historical simulation to estimate the ES of a portfolio. The value of the portfolio at market close of any given day depends on the price of a stock and the level of an interest rate at the close of that day. The analyst uses closing values of these variables on the most recent 501 trading days as the historical dataset for the simulation and collects the following data, with Day 0 representing the first data point and Day 500 representing the last data point of the historical period:

Day	Stock price (HKD)	Interest rate (%)
0	76.00	2.50%
1	72.00	2.60%
…	…	…
500	94.00	3.80%

What stock price and interest rate would be most appropriate for the analyst to use in the scenario of the historical simulation for Day 501?

A The stock price would be HKD 89.05, and the interest rate would be 3.90%

B The stock price would be HKD 89.05, and the interest rate would be 3.95%

C The stock price would be HKD 92.00, and the interest rate would be 3.90%

D The stock price would be HKD 92.00, and the interest rate would be 3.95%

3. Question

A risk manager at a bank is speaking to a group of analysts about estimating credit losses in loan portfolios. The manager presents a scenario with a portfolio consisting of two loans and provides information about the loans as given below:

	Loan 1	**Loan 2**
Amount borrowed	CNY 15 million	CNY 20 million
Probability of default	2%	2%
Recovery rate	40%	25%
Default correlation between Loan 1 and Loan 2	0.6	

Assuming portfolio losses are binomially distributed, what is the estimate of the standard deviation of losses on the portfolio?

A CNY 1.38 million

B CNY 1.59 million

C CNY 3.03 million

D CNY 3.36 million

4. Question

Dutch tulip mania is considered one of the first major financial bubbles. It occurred in 1636-37 when introduction of tulips imported from Turkey generated extremely high demand which led to an astronomical jump in prices. Tulips were first traded as forward contracts, but the government passed laws allowing certain contracts to be transformed to options contracts. Short selling was strictly prohibited.

After the price of tulips rose so high that a single bulb exceeded the cost of an average home, the price collapsed, and many investors went bankrupt. Which of the features of exchange markets listed below would have helped to prevent or mitigate the tulip mania?

A If Dutch exchanges had allowed only forward contracts, tulip sellers would have been contractually required to pay the full value of the contracts at expiry, which would have minimized speculative trades.

B By allowing the netting of multiple trades in the portfolio, exchanges help offset the risk from long and short trades, which can decrease potential losses in the portfolio.

C The main role of an exchange is to enforce payments by counterparties on both sides of the trades, which would have eliminated credit risk for tulip traders.

D Exchanges offer multiple protection tools that help against counterparty credit risk, but those tools do not protect against economic risk.

5. Question A credit risk analyst at a wholesale bank is estimating annual default probabilities of a 5-year loan that has just been extended to a corporate borrower. The analyst determines from rating agency data that the 5-year cumulative default probability of bonds from this borrower with identical terms and seniority is 6.2%, and uses this information to calculate the 5-year survival rate for the borrower. If the borrower's average hazard rate for the first 4 years of the loan is 1.1%, what is the unconditional default probability of the borrower during year 5 of the loan?

A 1.71%

B 1.80%

C 1.90%

D 1.98%

6. Question A risk manager at a bank is presenting at a seminar on derivative contracts to a group of newly hired junior analysts. The manager focuses on the features and uses of derivative contracts traded by financial market participants. Which of the following statements, if made by the manager, would be correct regarding these derivative contracts?

A A derivative contract allows a transfer of risks that is beneficial to both parties in the contract.

B Speculators use derivative contracts traded on exchanges, while hedgers use contracts traded in over-the-counter markets.

C Complex derivatives created with mortgages by banks in the years leading up to the 2007 – 2009 global financial crisis limited demand for housing and reduced the severity of the crisis.

D Derivative contracts such as forwards, futures, or options have linear payoff functions that depend on the value of the underlying asset.

7. Question An analyst wants to price a 6-month futures contract on a stock index. The index is currently valued at USD 750 and the continuously compounded risk-free rate is 3.5% per year. If the stocks underlying the index provide a continuously compounded dividend yield of 2.0% per year, what is the price of the 6-month futures contract?

A USD 744.40

B USD 755.65

C USD 761.33

D USD 763.24

8. Question A portfolio manager is assessing whether the 1-year probability of default of a longevity bond issued by a life insurance company is uncorrelated with returns of the equity market. The portfolio manager creates the following probability matrix based on 1-year probabilities from the preliminary research:

		Longevity bond	
		No default	**Default**
Market returns	**20% increase**	61%	1%
	20% decrease	35%	3%

Given the information in the table, what is the probability that the longevity bond defaults in 1 year given that the market decreases by 20% over 1 year?

A 3.00%

B 4.00%

C 7.89%

D 10.53%

9. Question

For a sample of 400 firms, the relationship between corporate revenue (Y_i) and the average years of experience per employee (X_i) is modeled as follows:

$$Y_i = \beta_1 + \beta_2 * X_i + \varepsilon_i \quad \text{i = 1, 2 ..., 400}$$

An analyst wants to test the joint null hypothesis that $\beta_1 = 0$ and $\beta_2 = 0$ at the 95% confidence level. The p-value for the t-statistic for β_1 is 0.07, and the p-value for the t-statistic for β_2 is 0.06. The p-value for the F-statistic for the regression is 0.045. Which of the following statements is correct?

A The analyst can reject the joint null hypothesis because each β is different from 0 at the 95% confidence level.

B The analyst cannot reject the joint null hypothesis because neither β is different from 0 at the 95% confidence level.

C The analyst can reject the joint null hypothesis because the F-statistic is significant at the 95% confidence level.

D The analyst cannot reject the joint null hypothesis because the F-statistic is not significant at the 95% confidence level.

10. Question

The CIO of a global macro fund is assessing the performance of the international portfolio managers of the fund. The CIO gathers the annualized total returns of a sample of the managers as presented in the following table:

Portfolio manager	Annualized total return
1	21%
2	17%
3	11%
4	18%
5	13%

The CIO calculates the central moments of these returns. What is the correct unbiased sample variance of the returns data?

A 0.00128

B 0.00160

C 0.00288

D 0.00360

11. Question A risk manager at an investment company is discussing stock index arbitrage with a group of junior risk analysts. The manager explains why an arbitrage trading strategy is an important factor in the efficient operation of financial markets and how an index arbitrage strategy is implemented. Which of the following statements is correct regarding stock index arbitrage?

A It involves purchasing one stock index futures contract and selling a different stock index futures contract.

B It involves purchasing a basket of stocks that are members of an index while selling other stocks in the same index.

C It ensures that the price of the index will always correspond to the value of a portfolio of the underlying stocks, even if the portfolio is not tradable.

D It involves selling a stock index futures contract and purchasing the portfolio of stocks underlying the index.

12. Question A risk manager on the derivatives trading desk of an investment bank is monitoring the sensitivity measures for several of the desk's positions in options on stock FIR. The current market price of the stock is USD 60. Which of the following options on stock FIR has the highest gamma?

A Long call option expiring in 5 days with strike price of USD 30

B Long call option expiring in 5 days with strike price of USD 60

C Long call option expiring in 30 days with strike price of USD 30

D Long call option expiring in 30 days with strike price of USD 60

13. Question

An analyst wants to price a 1-year, European-style call option on company REX's stock using the Black-Scholes-Merton (BSM) model. REX announces that it will pay a dividend of USD 1.25 per share on an ex-dividend date 1 month from now and has no further dividend payout plans. The relevant information for the BSM model inputs is in the following table:

Current stock price (S_0)	USD 60
Stock price volatility (σ)	12% per year
Risk-free rate (r)	3.5% per year
Call option exercise price (K)	USD 60
$N(d_1)$	0.570143
$N(d_2)$	0.522623

What is the price of the 1-year call option on the stock?

A USD 2.40

B USD 3.22

C USD 3.97

D USD 4.81

14. Question

A commodity trader observes that the 6-month forward price of commodity X is USD 1,000. The trader also notes that there is a 6-month zero-coupon risk-free bond with face value USD 1,000 that trades in the secondary fixed-income market. Which of the following strategies creates a synthetic long position in commodity X for a period of 6 months?

A Buy the forward contract and buy the zero-coupon bond.

B Buy the forward contract and short the zero-coupon bond.

C Short the forward contract and buy the zero-coupon bond.

D Short the forward contract and short the zero-coupon bond.

15. Question

A portfolio manager bought 600 call options on a non-dividend-paying stock, with a strike price of USD 60, for USD 3 each. The current stock price is USD 62 with a daily stock return volatility of 1.82%, and the delta of the option is 0.5. Using the delta-normal approach to calculate VaR, what is an approximation of the 1-day 95% VaR of this position?

A USD 54

B USD 557

C USD 787

D USD 1,114

16. Question An operational risk manager is presenting to a group of risk analysts about different techniques to model operational risk. An analyst asks the manager about the appropriate use of the power law in estimating operational losses. Which of the following would be a correct statement for the manager to make about the use of the power law?

A It implies that operational losses tend to follow a normal distribution.

B It is more effective in modeling some types of operational risk, such as losses from fraud, than others, such as losses from natural disasters.

C It is generally used to estimate routine operational losses which occur at a relatively high frequency.

D It is suitable for modeling the tail of the operational loss distribution, but not for modeling the body of the distribution.

17. Question A financial analyst is using ordinary least squares (OLS) estimation to explain the behavior of a financial variable. The analyst notes that the proper selection of regressors to include in an OLS estimation is critical to the accuracy of the result. When does omitted variable bias occur?

A Omitted variable bias occurs when the omitted variable is correlated with an included regressor and is a determinant of the dependent variable.

B Omitted variable bias occurs when the omitted variable is correlated with an included regressor but is not a determinant of the dependent variable.

C Omitted variable bias occurs when the omitted variable is independent of an included regressor and is a determinant of the dependent variable.

D Omitted variable bias occurs when the omitted variable is independent of an included regressor but is not a determinant of the dependent variable.

18. Question A newly hired treasury risk analyst at a large bank has been assigned to the team responsible for managing the liquidity risk of the bank. The analyst is reviewing the tasks that will be required as part of this function. Which of the following is most likely part of the treasury risk analyst's job duties?

A Building VaR models

B Purchasing credit default swaps

C Implementing asset-liability management

D Estimating loss given default

19. Question A junior analyst has just started working for a national banking supervisor and is training for a position as a bank examiner. As part of the training program, the analyst is asked to explain how banking regulations evolved as a result of the 2007 – 2009 financial crisis to encourage better risk governance. Which of the following correctly describes an impact of regulations that were introduced as a result of the crisis?

A Banks were required to securitize all the mortgages they originate in order to distribute risk across financial institutions.

B Banks were encouraged to establish an independent risk management function with access to the board of directors.

C Proprietary trading operations were merged with traditional banking operations to provide banks better governance over their trading desks.

D Derivatives were encouraged to be traded OTC rather than centrally cleared to provide greater transparency.

20. Question A newly hired risk analyst at a bank is a certified FRM. The analyst is reviewing the bank's policies and procedures related to employee conduct and notices areas where they conflict with the GARP Code of Conduct. Which of the following is a potential consequence of violating the GARP Code of Conduct once a formal determination is made that such a violation has occurred?

A Formal notification of a violation sent to the GARP Member's employer

B Suspension of the GARP Member's right to work in the risk management profession

C Removal of the GARP Member's right to use the FRM designation

D Required participation by the GARP Member in ethics training

21. Question A risk manager at a major global bank is conducting a time series analysis of equity returns. The manager wants to know whether the time series is covariance stationary. Which of the following statements describes one of the requirements for a time series to be covariance stationary?

A The distribution of a time series should have a kurtosis value near 3.0, ensuring no fat tails will distort stationarity.

B The distribution of a time series should have a skewness value near 0, so that its mean will fall in the center of the distribution.

C The autocovariance of a covariance stationary time series depends only on the lag, h, between observations, not on time.

D When the autocovariance function is asymmetric with respect to lag, h, forward looking stationarity can be achieved.

22. Question A risk manager at a pension fund is analyzing the risk profile of several of the fund's portfolios. The portfolios are invested in different asset classes and have the same current market value. Which of the following portfolios would likely have the highest potential level of unexpected loss during a sharp broad-based downturn in financial markets?

A A portfolio of US Treasury notes with 2 to 5 years to maturity

B A portfolio of long stock positions in an international large cap stock index combined with long put options on the same index

C A portfolio of mezzanine tranche MBS structured by a large regional bank

D A short position in futures for industrial commodities such as copper and steel

23. Question A start-up company is undergoing a series of operational changes. The company expects to receive a round of equity capital to finance its growth strategies. A risk manager at the company is evaluating the risk of the company as well as the company's new capital structure. The manager notes that the company has decided to switch its business focus to riskier projects upon receiving the equity funding. Which of the following is most likely correct for the manager to conclude once the funding completes and the new projects are undertaken?

A The company's risk capacity will decrease and its risk appetite will increase.

B The company's risk capacity will increase and its risk appetite will decrease.

C Both the company's risk capacity and risk appetite will remain the same.

D Both the company's risk capacity and risk appetite will increase.

24. Question A risk consultant is presenting to a group of junior risk managers on how risk management failures contributed to financial disasters. The consultant focuses on the lessons learned from examining historical financial disasters in the US and around the world. Which of the following correctly describes a lesson learned from the given case?

A The Orange County case emphasizes the importance of fully understanding complex derivative contracts before entering into them.

B The London Whale case emphasizes the importance of recognizing that correlations can increase sharply during a global financial crisis.

C The Northern Rock case emphasizes the importance of having a strong cybersecurity framework.

D The LTCM case emphasizes the importance of meeting regulatory capital requirements.

25. Question

An analyst is evaluating the performance of a portfolio of Mexican equities that is benchmarked to the IPC Index. The analyst collects the information about the portfolio and the benchmark index, shown below:

Expected return of the portfolio	8.7%
Volatility of returns of the portfolio	12.0%
Expected return of the IPC	4.0%
Volatility of returns of the IPC	8.7%
Risk-free rate of return	2.0%
Beta of portfolio relative to IPC	1.4%

What is the Sharpe ratio of this portfolio?

A 0.036

B 0.047

C 0.389

D 0.558

26. Question

A risk manager asks a junior risk analyst to assess the prepayment risk on a pool of fixed-rate mortgages. In order to calculate the conditional prepayment rate (CPR) for the pool, the analyst begins by estimating the monthly prepayments on one selected mortgage. At origination, the 30-year mortgage was a USD 1,750,000 loan making monthly mortgage payments at a fixed mortgage rate of 8% per year. Assuming the borrower made a total payment on the mortgage of USD 15,950.00 in one specific month, and the loan balance at the beginning of that month was USD 1,644,235.78, what is the correct estimate of the prepayment amount for that month?

A USD 3,060.29

B USD 4,933.62

C USD 11,016.38

D USD 14,076.60

27. Title

A risk manager at a civil service pension scheme is conducting a year-end review on the disbursement preferences of 100 retirement plan beneficiaries and observes the following:

- 57 beneficiaries have opted to receive monthly disbursements.
- 43 beneficiaries have opted to receive a lump-sum payment.
- In addition, 24 of the beneficiaries that have opted to receive monthly disbursements will also receive a lump-sum payment after a period of time.

If a retirement plan beneficiary selected at random from this sample has opted for monthly disbursements, what is the probability that the beneficiary will also receive a lump-sum payment?

A 24%

B 42%

C 50%

D 56%

28. Question

An analyst is testing a hypothesis that the beta, β, of stock CDM is 1. The analyst runs an ordinary least squares regression of the monthly returns of CDM, R_{CDM}, on the monthly returns of the S&P 500 Index, R_m, and obtains the following relation:

$$R_{CDM} = 0.86R_m - 0.32$$

The analyst also observes that the standard error of the coefficient of R_m is 0.80. In order to test the hypothesis H_0: $\beta = 1$ against H_1: $\beta \neq 1$, what is the correct statistic to calculate?

A t-statistic

B Chi-squared test statistic

C Jarque-Bera test statistic

D Sum of squared residuals

29. Question

A data analyst at a large bank is assessing the valuation of a unique stock option with few known properties. The analyst is considering using simulation to model the option's potential value. The analyst considers whether to use Monte Carlo simulation or bootstrapping to conduct the analysis. Which of the following statements about bootstrapping is correct?

A Data used for bootstrapping must follow a standard normal distribution.

B Data used for bootstrapping must be resampled with replacement.

C Data used for bootstrapping must come from a variable with known properties.

D Data used for bootstrapping must be resampled such that all possible outcomes in a probability space are present.

30. Question A risk analyst is assessing the correlation between the returns of two financial assets. The analyst wants to determine if the two sets of returns are dependent. Which of the following is correct regarding correlation and dependence?

A Returns on financial assets tend to be independent.

B Pearson's correlation measures both linear and nonlinear dependence.

C Correlation and the regression slope are closely related.

D If the returns of the two assets are normally distributed, their rank correlation and Pearson's correlation would not be equal.

31. Title A senior trader on the fixed-income trading desk of an investment bank is presenting to a group of newly hired analysts on key drivers of credit risk. The trader illustrates the concept of recovery rates using a scenario of a bank buying a corporate bond. Which of the following would the trader be correct to identify as an example of a corporate bond that is held by the bank and has a recovery rate of 35%?

A If the corporate issuer becomes insolvent, liquidation of the issuer's assets would result in the bank receiving 35% of the price it initially paid for the bond.

B If the corporate issuer defaults on a collateralized bond, the bank would take possession of an amount of collateral valued at 65% of the bond's face value.

C At the time the bank purchases the bond, there is a 65% unconditional probability that the corporate issuer will not make full and timely payments on the bond.

D If the corporate issuer defaults on the bond, the value of the bond shortly after default is expected to equal 35% of the bond's par value.

32. Question A financial institution is planning to add stressed VaR to the measures it uses to assess market risk. In preparation for this development, a risk analyst at the institution researches the differences between stressed VaR and traditional VaR, including the appropriate data, time horizons, and distributions. Which of the following is a major characteristic of stressed VaR that distinguishes it from traditional VaR?

A Stressed VaR is based on an unconditional loss distribution rather than a conditional loss distribution.

B Stressed VaR typically uses much longer time horizons, often several months or years.

C Stressed VaR uses a different assumed probability distribution as an input compared to traditional VaR.

D Stressed VaR is not necessarily based on data from the immediately preceding period, unlike traditional VaR.

33. Question A derivatives trader is determining the bounds for prices of several options on a stock. The current share price of the stock is USD 100.00, and the continuously compounded risk-free rate is 12% per year. What are the upper bounds for the prices of a 3-month European-style call option, American-style call option, European-style put option, and American-style put option, respectively, if the strike price for each option is USD 90.00?

A USD 97.04; USD 97.04; USD 87.34; USD 87.34

B USD 97.04; USD 100.00; USD 90.00; USD 90.00

C USD 100.00; USD 100.00; USD 87.34; USD 90.00

D USD 100.00; USD 100.00; USD 90.00; USD 90.00

34. Question An option trader at an equity hedge fund is assessing the cost structure of the fund's portfolio of options. The trader examines the types of positions the fund trades with its prime brokers and investigates whether the fund can reduce the upfront costs of its option positions. How can the trader transform a long option into a zero-cost derivative product?

A Arranging with the option seller to pay an amount equal to the upfront option premium at maturity rather than at option initiation

B Entering into an agreement to purchase the payoff of the option at maturity for an amount equal to the future value of the current option premium

C Combining the purchase of the option with a sale of other options such that the net premium is zero and the combined payoff is identical to the payoff of the original option

D Purchasing the option and selling the underlying stock such that the net upfront cash flow is zero and the payoff is identical to the payoff of the original option

35. Question A fixed-income trader recently joined a large bank that acts as a dealer in the sovereign bonds of several countries. The trader researches the differences between a country's foreign currency sovereign bonds and its local currency sovereign bonds, including the differences in their default risk and investor demand. Which of the following would the trader find to be correct?

A A country's foreign currency debt rating is typically higher than its local currency debt rating.

B Investors in foreign currency sovereign bonds typically lose the entire value of their investment upon a country's default, whereas investors in local currency bonds do not.

C Debt issued in foreign currency is usually sold to investors based in the issuing country.

D Printing money to pay its local currency debt can be useful for a country in the short term, but can result in serious economic consequences in the long term.

36. Question

Bank A and Bank B are two competing investment banks. The banks are calculating the 1-day 99% VaR for a long position in an at-the-money call option on a non-dividend-paying stock with the following information:

- Current stock price: USD 120
- Estimated annual stock return volatility: 18%
- Current Black-Scholes-Merton call option value: USD 5.20
- Call option delta: 0.6

To compute VaR, Bank A uses the delta-normal model, while Bank B uses a Monte Carlo simulation method for full revaluation. Which bank will estimate a higher value for the 1-day 99% VaR?

A Bank A

B Bank B

C Both banks will have the same VaR estimate

D Insufficient information to determine

37. Question

A currency derivatives trader at a hedge fund is describing the mechanics of currency swaps to a group of junior analysts. The trader uses an example of a fixed-for-fixed USD for CNY currency swap with the following terms:

- Notional amount in USD: USD 10 million
- Notional amount in CNY: CNY 65 million
- Interest rate in USD: 1.0%
- Interest rate in CNY: 2.5%
- Time to maturity: 4 years
- Frequency of interest payments: Annual

Assuming the hedge fund receives interest in CNY, which of the following conclusions would the analysts find to be most likely correct?

A Interest payments will be exchanged periodically for the duration of the swap, but the notional amounts will not be exchanged.

B The hedge fund will pay CNY 65 million and receive USD 10 million at the initiation of the swap.

C The swap is structured to have a positive mark-to-market value for the hedge fund at the initiation of the swap.

D Holding all else constant, if the CNY depreciates against the USD, the mark-to-market value of the swap will increase for the hedge fund.

38. Question

A junior analyst at a banking supervisory agency is taking an internal training class on the Vasicek model. The analyst reviews the following equations related to the model:

$$U_i = aF + \sqrt{1 - a^2 Z_i}$$

$$Default\ rate\ as\ a\ function\ of\ F = N\left(\frac{N^{-1}(PD) - aF}{\sqrt{1 - a^2}}\right)$$

Which of the following statements regarding the Vasicek model is correct?

A The default probabilities of the individual loans in a portfolio are each mapped to the standard normal distribution U_i, of which values in the extreme right tail represent default.

B A low value of the factor *F* indicates that the economy is strong, while a high value of *F* represents economic weakness.

C For corporate borrowers, the value of the factor *F* is higher for loans to companies with more cyclical businesses.

D The model coefficient a directly relates to the correlations between the default probability distributions U_i of the loans in the portfolio.

39. Question

Pear, Inc. is a manufacturer that is heavily dependent on plastic parts shipped from Malaysia. Pear wants to hedge its exposure to plastic price shocks over the next 7.5 months. Futures contracts, however, are not readily available for plastic. After some research, Pear identifies futures contracts on other commodities whose prices are closely correlated to plastic prices. Futures on Commodity A have a correlation of 0.85 with the price of plastic, and futures on Commodity B have a correlation of 0.92 with the price of plastic. Futures on both Commodity A and Commodity B are available with 6-month and 9-month expirations. Ignoring liquidity considerations, which contract would be the best to minimize basis risk?

A Futures on Commodity A with 6 months to expiration

B Futures on Commodity A with 9 months to expiration

C Futures on Commodity B with 6 months to expiration

D Futures on Commodity B with 9 months to expiration

40. Question

A fixed-income portfolio manager currently holds a bullet 7-year US Treasury position with USD 60 million face value. The manager would like to create a cost matching barbell portfolio by purchasing a combination of a 2-year Treasury and a 15-year Treasury that would have the same duration as the 7-year US Treasury position. The data for the three US Treasuries are listed below:

Maturity	Price	Duration
2 years	100.972	1.938
7 years	106.443	6.272
15 years	122.175	11.687

Which of the following combinations correctly describes the weights of the two bonds that the manager will use to construct the barbell portfolio?

	Weight of 2-Year Treasury	Weight of 15-Year Treasury
A	14.22%	85.78%
B	44.46%	55.54%
C	55.54%	44.46%
D	85.78%	14.22%

41. Question

A junior risk analyst is modeling the volatility of a certain market variable. The analyst considers using either the EWMA or the GARCH (1,1) model. Which of the following statements is correct?

A The EWMA model is a special case of the GARCH (1,1) model with the additional assumption that the long-run volatility is zero.

B A variance estimated from the GARCH (1,1) model is a weighted average of the prior day's estimated variance and the prior day's squared return.

C The GARCH (1,1) model assigns a higher weight to the prior day's estimated variance than the EWMA model.

D A variance estimated from the EWMA model is a weighted average of the prior day's estimated variance and the prior day's squared return.

42. Question

A risk analyst is studying the history of the subprime mortgage crisis that took place in the US between 2007 and 2009. The risk analyst finds that the delinquencies of subprime mortgages rose significantly after mid-2005. Which of the following was a contributing factor for the increase in delinquencies?

A Mortgages became increasingly over-collateralized in 2005.

B Interest rates decreased significantly throughout 2005.

C Many first-time home buyers paid zero down payment in 2005.

D Housing prices began to rise sharply at the end of 2005.

43. Question

A market risk analyst is projecting a range of returns on stock XYZ for the next month. Using the returns of the prior 12 months, the analyst estimates the mean monthly return of the stock to be -0.75% with a standard error of 2.70%.

One-tailed t-distribution table			
Degrees of freedom	**α**		
	0.100	**0.050**	**0.025**
8	1.397	1.860	2.306
9	1.383	1.833	2.262
10	1.372	1.812	2.228
11	1.363	1.796	2.201
12	1.356	1.782	2.179

Using the t-table above, which of the following is the 95% confidence interval for the mean return of stock XYZ?

A -6.69% and 5.19%

B -6.63% and 5.13%

C -5.60% and 4.10%

D -5.56% and 4.06%

44. Question

A financial analyst is concerned about the market risk of a stock. Based on the stock's return data of the most recent 12 months, it has been estimated that the historical volatility of the monthly returns is 4.5%. Which of the following is most likely correct?

A The implied volatility of the annual returns is 15.6%.

B The implied volatility of the annual returns is 54.0%.

C The volatility of the annual returns is 15.6%.

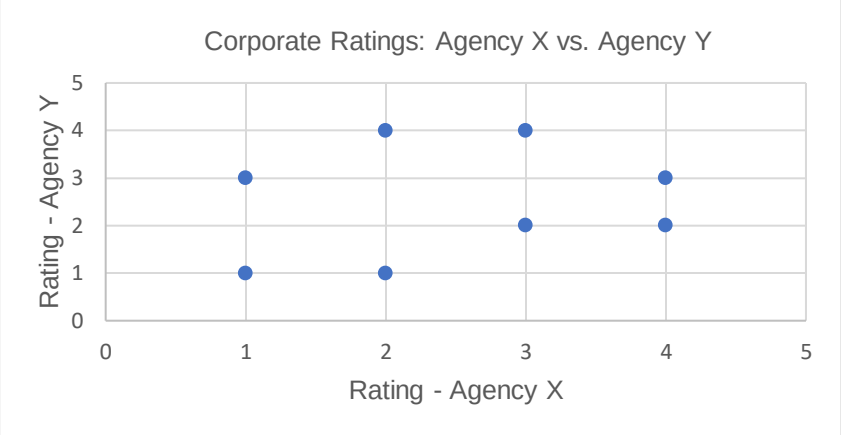
D The volatility of the annual returns is 54.0%.

45. Question

A credit risk manager is in charge of credit risk analysis of large corporates at Bank XYZ. The manager is in possession of credit ratings provided by two rating agencies, X and Y, for 30 companies the manager oversees. The ratings are classified into four categories:

Rating categories	Description
1	High investment grade
2	Mid investment grade
3	Low investment grade
4	Non-investment grade

The manager plots the rating categories from the two agencies as shown below:



Which of the following statistical measures could best help the manager approximate the link between rating categories from the two agencies?

A Spearman correlation

B Pearson correlation

C Structured correlation matrix

D Covariance

46. Question

An analyst is evaluating a dataset of annual returns for a financial asset. The analyst decides to use the Jarque-Bera test to determine if the returns of the asset are normally distributed. Which of the following is correct regarding the Jarque-Bera test?

A The Jarque-Bera test statistic follows a Student's t distribution.

B The Jarque-Bera test only takes into account the skewness and kurtosis of a distribution.

C The Jarque-Bera test requires that a Gaussian copula be applied to the returns data before conducting the test.

D The Jarque-Bera test statistic does not depend on the sample size of the returns dataset.

47. Question

An analyst is conducting a Monte Carlo simulation to estimate the expected value of a random variable. The analyst wants to reduce the standard error of the simulated expectation. Which of the following correctly describes a method for reducing the standard error?

A Increasing the expected value of the simulation

B Increasing the number of replications

C Increasing the variance of the distribution

D Increasing the confidence level of the simulation

48. Question

An investment advisor is analyzing the range of potential expected returns of a new fund designed to replicate the directional moves of the China Shanghai Composite Stock Market Index (SHANGHAI) but with twice the volatility of the index. SHANGHAI has an expected annual return of 7.6% and a volatility of 14.0%, and the risk-free rate is 3.0% per year. Assuming the correlation between the fund's returns and that of the index is 1.0, what is the expected return of the fund using the CAPM?

A 12.2%

B 19.0%

C 22.1%

D 24.6%

49. Question

The board of directors of a growing asset management company is conducting a review of the firm's approach to risk management. The board concludes that the firm should establish an ERM framework. Which of the following represents a key benefit that the firm will likely attain after establishing an ERM framework?

A Allowing the company to determine and make use of a higher risk appetite

B Finding the optimal reporting methodology for each risk function

C Improving the top-down communication and coordination in the company

D Taking advantage of the new opportunities that create value on a standalone basis

50. Question

A risk analyst is estimating the variance of returns on a stock index for the next trading day. The analyst uses the following GARCH (1,1) model:

$$\sigma_n^2 = \alpha r_{n-1}^2 + \beta \sigma_{n-1}^2 + \gamma V_L,$$

where σ_n^2, r_{n-1}, and σ_{n-1} represent the index variance on day n, return on day n-1, and volatility on day n-1, respectively. If the expected value of the return is constant over time, which combination of values for α and β would result in a stable GARCH (1,1) process?

A α = 0.073637 and β = 0.927363

B α = 0.075637 and β = 0.923363

C α = 0.084637 and β = 0.916363

D α = 0.086637 and β = 0.914363

51. Question

A portfolio manager is analyzing the impact of yield changes on two portfolios: portfolio ASD and portfolio BTE. Portfolio ASD has two zero-coupon bonds and portfolio BTE has only one zero-coupon bond. Additional information on the portfolio is provided in the table below:

	Portfolio components	Yield per year	Maturity (years)	Face value
Portfolio ASD	Bond 1	10%	3	USD 1,000,000
	Bond 2	10%	9	USD 1,000,000
Portfolio BTE	Bond 3	8%	6	USD 1,000,000

To assess the potential effect of a parallel shift in the yield curve on portfolio values, the manager runs a scenario in which yields increase by 200 bps across all points of the yield curve. In addition, the manager estimates a convexity of 34.51 for portfolio ASD and 36.00 for portfolio BTE. Assuming continuous compounding, which of the following are the best estimates of the decrease in the values of the two portfolios due to the combined effects of duration and convexity?

A Portfolio ASD decreases by USD 102,000; portfolio BTE decreases by USD 65,000

B Portfolio ASD decreases by USD 110,000; portfolio BTE decreases by USD 70,000

C Portfolio ASD decreases by USD 118,000; portfolio BTE decreases by USD 74,000

D Portfolio ASD decreases by USD 127,000; portfolio BTE decreases by USD 79,000

52. Question

The treasurer of a London-based insurance company expects that 3 years from today the company will receive GBP 800,000. The treasurer plans to invest the funds for 1 year after that and decides to lock in a rate of return on the funds at today's forward rate for the period. The current 3-year and 4-year spot rates are 1.5% and 2% respectively, and the company can borrow and lend at these rates. Assuming continuous compounding, how much interest income will the company earn in the 1-year period beginning 3 years from today, and what transactions should the treasurer enter into today in order to lock in this return?

A Borrow at the 3-year spot rate and lend at the 4-year spot rate to earn a return of GBP 28,000.

B Lend at the 3-year spot rate and borrow at the 4-year spot rate to earn a return of GBP 28,000.

C Borrow at the 3-year spot rate and lend at the 4-year spot rate to earn a return of GBP 28,119.

D Lend at the 3-year spot rate and borrow at the 4-year spot rate to earn a return of GBP 28,119.

53. Question A derivatives desk trades a large volume of US Treasury bond futures contracts. A junior analyst at the desk is asked to monitor the bond markets and the process of delivering a bond against an expiring futures contract. The analyst studies how changes in market conditions determine which bonds are more likely to be the cheapest-to-deliver and how the process of delivery impacts the futures price. Which of the following observations will the analyst find to be correct?

A As bond yields increase, short maturity bonds with low coupons will tend to be the cheapest-to-deliver.

B The embedded options associated with delivery against a US Treasury futures contract tend to increase the value of the contract.

C The “wild card play” benefits owners of long positions in expiring futures contracts by allowing them to determine when counterparties holding short positions will deliver.

D A downward-sloping yield curve makes it more likely that short-maturity bonds will be cheapest-to-deliver.

54. Question The CRO of a multinational bank has assigned a team of risk analysts to design scenarios for an upcoming stress test. The analysts discuss the common approaches used by financial institutions to develop scenarios. Which of the following statements regarding stress testing scenarios is correct?

A Scenarios that have not occurred in the past, but are created by assuming changes of a certain amount in key variables, are typically not used in stress testing.

B Extremely adverse scenarios can be developed from moderately adverse periods in the past by multiplying movements in all risk factors by a certain amount, although this approach may fail to account for changes in correlations between these factors.

C Historical scenarios of one day or one week in length are not useful in stress testing because such periods are not considered long enough to pose a meaningful threat to a bank’s financial stability.

D Senior management should leave the development of scenarios to risk managers and analysts who have the deepest knowledge of the risk exposures of the various business lines.

55. Question

A group of credit risk analysts at a large bank is discussing regulatory capital and economic capital in relation to different types of risk exposures. The analysts evaluate differences in the approach to calculating these measures and in their use. In comparing the two types of capital, which of the following statements would the analysts be correct to make?

A Firm-wide economic capital is typically equal to the sum of the separately calculated capital amounts for credit risk, market risk, and operational risk.

B An increase in the probability of default of a loan portfolio increases economic capital, while leaving regulatory capital unchanged.

C Economic capital is the amount of capital a bank needs to cover its expected losses, while regulatory capital is the amount of capital a bank needs to cover its unexpected losses.

D Firm-wide economic capital typically considers correlations between credit risk, market risk, and operational risk.

56. Question

A large international bank has branches in four different countries. The CFO of the bank is considering issuing a bond in one of those countries, and believes that the country with the lowest real interest rate would present the best terms to the bank. Relevant information is in the table below:

Country	Nominal interest rate	Inflation
A	3.9%	1.9%
B	4.1%	2.0%
C	4.2%	2.3%
D	4.6%	2.5%

Assuming that all other parameters are equal, in which of the four countries should the bank issue the bond?

A Country A

B Country B

C Country C

D Country D

57. Question A junior credit risk analyst at a US firm is preparing a research report on the attributes and performance of corporate bonds. The analyst assesses corporate bond default rates, credit spread risk, recovery rates, and their impact on portfolio returns for a typical class of investment grade bonds. Which of the following statements would the analyst be correct to include in the report?

A The distribution of recovery rates of corporate issues is best described as a binomial distribution.

B The size of a bond issuance is not empirically related to its recovery rates.

C Measured over the same time period, US Treasury securities always outperform a portfolio of corporate bonds that experiences defaults.

D Spread duration is best measured by the change in the corporate bond yield for a given 100 bp change in the Treasury rate.

58. Question An operational risk analyst is attempting to estimate a bank's loss severity distribution. However, there is a limited amount of historical data on operational risk losses. Which of the following is the best way to address this issue?

A Generate additional data using Monte Carlo simulation and merge it with the bank's internal historical data.

B Estimate the parameters of a Poisson distribution to model the loss severity of operational losses.

C Estimate relevant probabilities using loss information that is published by credit rating agencies.

D Merge external data from other banks with the bank's internal data after making appropriate scale adjustments.

59. Question A market risk team at a hedge fund is developing stress test scenarios to assess the impact of changes in different market variables on the fund's portfolio of agency-backed MBS. The team wants to identify potential factors that would likely cause the rate of prepayments on the MBS portfolio to increase. Holding all else constant, which of the following would most likely result in increased prepayments in the portfolio?

A A decrease in defaults experienced in the mortgage pool

B A decrease in the average loan-to-value ratio of the mortgage pool

C An increase in market interest rates

D An increase in the supply of newly built housing

60. Question

A risk analyst at a financial institution is preparing a report on capital requirements for the senior management team to be used in risk appetite discussions. The analyst compares regulatory capital and economic capital requirements in the report. Which of the following statements is correct for the analyst to include in the report?

A The regulatory capital for credit risk is designed to be sufficient to cover a loss that is expected to be exceeded only once every ten years.

B Regulatory capital is sometimes referred to as going concern capital because it absorbs losses incurred while the bank is still in business.

C The most important capital for a bank is regulatory capital, which equals the bank's estimate of its expected losses.

D Economic capital is an internal risk measure that reflects the amount of capital needed to ensure a company remains solvent with a high level of confidence, given its risk profile.

61. Question

An analyst at an investment firm is researching the fee structures at several hedge funds. The analyst notes that, in the past, incentive fees strongly favored hedge fund managers to the disadvantage of investors in the hedge funds, causing investors to be reluctant to invest in them. Many hedge funds have recently adjusted the terms they offer to attract new investors. Which of the following correctly describes one of these adjustments to the fee structure?

A A high-water mark clause states that incentive fees will only be paid when returns are above a certain percentage return each year.

B A hurdle rate states that incentive fees will only be paid when cumulative investor profits are positive and are above a specified amount.

C A clawback clause provides a mechanism for investors to reclaim incentive fees that have already been paid.

D A proportional adjustment clause provides a mechanism to raise the hurdle rate as the hedge fund generates more profits.

62. Question

Bank QRS is considering extending loans to corporations based in a frontier market country. A credit risk analyst at the bank has conducted research on the country to determine factors that may affect its country risk and has compiled the following findings:

- Item 1: The country's economy is dominated by oil production, and it holds significant oil reserves.
- Item 2: The country has recently enacted laws making it easier for investors to file lawsuits against firms and their management teams than before.
- Item 3: The country has recently reformed its legal system to make it more independent of other branches of government.
- Item 4: The country's sovereign credit spreads have declined over the past year.

Which of these items is most likely to have a negative impact on the country's risk score?

A Item 1

B Item 2

C Item 3

D Item 4

63. Question

A newly hired risk analyst at a bank is studying historical cases of financial disasters and their causes to learn how financial risks can arise in practice. The analyst focuses on the example of Barings Bank. Which of the following statements is correct for the analyst to make regarding the collapse of Barings Bank?

A A rogue trader at Barings Bank convinced the bank's risk controllers that large unauthorized trades were necessary to hedge the bank's portfolios.

B Management of Barings Bank failed to investigate the high level of reported profits that were associated with supposedly low-risk trading strategies.

C Traders at Barings Bank traded primarily in OTC foreign currency swaps that allowed the bank to delay cash payments on losing trades.

D Management of Barings Bank was not aware of the losses incurred by the bank until clients reported unusual losses on trades that were booked to their accounts.

64. Question

A market risk manager is analyzing the performance of VTFX, a large cap growth mutual fund that uses the performance of the MSCI World Large Cap Growth Index (MWG) as a benchmark. The manager runs a regression using monthly returns of VTFX as the dependent variable and monthly returns of the MWG as the explanatory variable. The constructed regression model and the results of the regression are as follows:

$$VTFX_t = \beta_0 + \beta_1(MWG_t) + \varepsilon_t$$

Coefficient	Coefficient estimate	Standard error
β_0	-0.0178	0.0139
β_1	1.2631	0.0428
Source of variation	**Sum of squares**	
Explained	0.0527	
Residual	0.0091	

At a 95% confidence level, which of the following conclusions would be correct for the manager to make?

A Both the slope coefficient and the intercept coefficient are not statistically significant.

B Both the slope coefficient and the intercept coefficient are statistically significant.

C The intercept coefficient is statistically significant, but the slope coefficient is not.

D The slope coefficient is statistically significant, but the intercept coefficient is not.

65. Question

A certified FRM working as a risk manager at a bank is asked by the CRO to present a report to the public on the bank's compliance with industry best practices in risk management. The risk manager includes information about risk adjusted returns of specific clients in the report to support the conclusion that the bank's risk management practices are strong. Which of the following statements is most appropriate regarding the adherence of the manager's behavior to the standards of the GARP Code of Conduct in this situation?

A The manager violates the GARP Code of Conduct because the manager discloses some of the bank's confidential information.

B The manager violates the GARP Code of Conduct because the manager overstates the strength of the bank's risk management practices in the report.

C The manager violates the GARP Code of Conduct because the manager does not distinguish between facts and opinions.

D The manager does not violate the GARP Code of Conduct.

66. Question A quantitative analyst is building a model whose output depends on the value of a financial variable, X. The analyst assumes X is a random variable that follows a normal distribution with a mean of 40 and a standard deviation of 14. What is the probability that X lies outside the range between 12 and 61?

A 4.56%

B 6.18%

C 8.96%

D 18.15%

67. Question An investment performance analyst is calculating some performance measures on portfolio LCM. Portfolio LCM has an expected return of 9%, volatility of 21%, and a beta of 0.3. If the risk-free rate is 3%, what is the Treynor measure of portfolio LCM?

A 0.08

B 0.15

C 0.20

D 0.40

68. Question A risk consultant is advising a pension fund to revise its asset allocation approach to be more consistent with the theory of CAPM. The consultant prepares a list of the assumptions of CAPM to support the advice. Which of the following is an assumption of CAPM?

A There are transaction costs associated with buying and selling assets.

B An individual investor can affect the price of a stock by buying or selling that stock.

C Investors make their investment decisions by taking into account their personal income taxes.

D Investors have the same expectations regarding the expected returns and the variance of returns of all assets.

69. Question

The recent performance of Prudent Fund, a fund with USD 50 million of assets under management, has been weak and the institutional sales group is recommending that it be merged with Aggressive Fund, a USD 200 million fund. The returns on Prudent Fund are normally distributed with a mean of 3% and a standard deviation of 7%, and the returns on Aggressive Fund are normally distributed with a mean of 7% and a standard deviation of 15%. Assuming the returns on the two funds are independent, what is the probability that the returns on the combined fund will exceed 26%?

A 1.0%

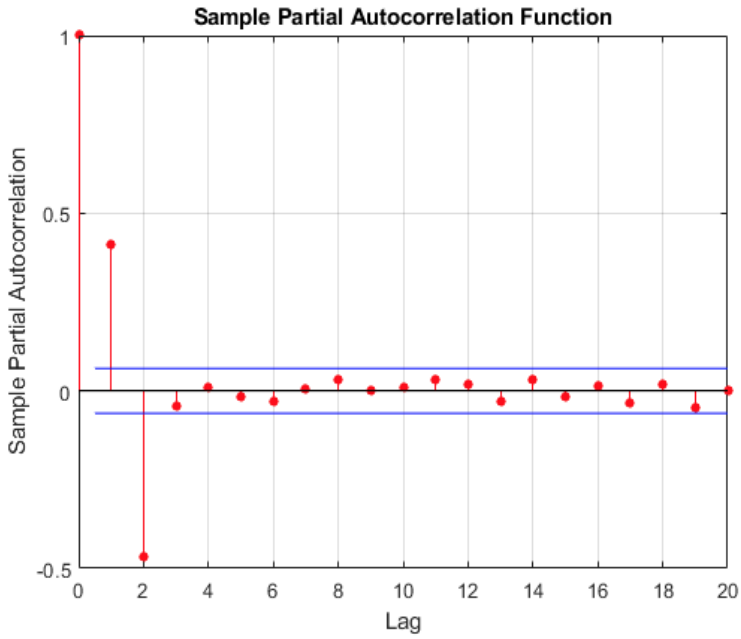
B 2.5%

C 5.0%

D 10.0%

70. Question

A market risk manager would like to analyze and forecast a security performance and has obtained the historical time series for that security. The manager consults a colleague from the quantitative analytic team who provides the following Partial Autocorrelation Function (PACF) plot:



Based on the plot above, which of the following is the best regression approach for the security?

A AR(1)

B MA(1)

C AR(2)

D MA(2)

71. Question

A risk manager at a bank is measuring the sensitivity of a bond portfolio to non-parallel shifts in spot rates. The portfolio currently holds a 4-year zero coupon bond and a 7-year zero coupon bond with the following sensitivities to these respective spot rates:

Spot rate	Change in portfolio value for 1-bp increase in spot rate (AUD)
4-year	-189.27
7-year	-302.45

To model the non-parallel movement of the spot rate curve, the manager treats the 2-year, 5-year, and 10-year spot rates as key rates. Given this information, what is the portfolio's key rate 01 (KR01) for a 1-bp increase in the 5-year rate?

A AUD 184.06

B AUD 226.99

C AUD 307.66

D AUD 491.72

72. Question

A fixed-income analyst is decomposing the profit and loss (P&L) of a bond over the past 6 months. The bond has a 2% coupon rate, paid semi-annually, and had exactly 2 years remaining until maturity at the start of the 6-month period. Relevant information about the bond and market rates (semi-annually compounded) is shown below:

	Beginning	Ending
Bond price (SGD)	100.35	101.24
Bond spread (bps)	30	20

Forward rates (periods in years)	Beginning	Ending
0 – 0.5	0.8%	0.7%
0.5 – 1	1.4%	1.0%
1 – 1.5	1.8%	1.2%
1.5 – 2	2.1%	2.0%

The analyst has calculated the bond's carry roll-down, and under the forward rate assumption made for the purpose of that calculation, the ending value of the bond is SGD 100.55. Given this information, what is the component of the bond's P&L attributable to the change in rates over the 6-month period?

A SGD 0.54

B SGD 0.69

C SGD 0.74

D SGD 0.99

73. Question

An analyst at a mining company is reviewing the potential cash flow and accounting impact of a 3-year hedge on the company's copper production. The hedge was established by selling 100 three-year futures contracts at USD 3.00 per pound of copper on December 31, 2022, with each contract representing 25,000 pounds of copper. The analyst uses the following information:

Date	Futures price (USD)
December 31, 2022	3.00
December 31, 2023	2.95
December 31, 2024	3.10
December 31, 2025	3.15

The company uses hedge accounting and reports cash flows due to variation margin on the hedge at the end of each calendar year. Which of the following is the best estimate to reported cash flow on December 31, 2024?

A A cash inflow of USD 125,000

B A cash outflow of USD 250,000

C A cash outflow of USD 375,000

D A cash outflow of USD 500,000

74. Question

A junior trader at an investment company is studying the structure of futures markets and the related spot markets for their underlying assets. The trader wants to identify any relationships that exist between the price movements in each market and any specific trades that can be recommended based on these relationships. Which of the following is correct regarding futures prices and spot prices?

A Futures prices may vary widely from the spot price of the underlying asset, but the two prices will typically converge as a futures contract approaches maturity.

B Arbitrageurs keep the futures price and the underlying spot price close to each other throughout the life of the contract.

C If the futures price is above the underlying spot price during the delivery period, a trader can profit by buying futures contracts and selling the underlying asset in the spot market.

D The S&P 500 futures contract has the most trading activity of any futures contract due to its requirement to take physical delivery on the delivery date.

75. Question An emerging market bank that has previously calculated operational risk capital using the basic indicator approach will begin using the Basel II standardized approach instead, having just met the necessary criteria for doing so. Which of the following correctly describes a way in which the bank's operational risk capital calculations will change?

A The calculations will be based on a percentile of a loss distribution rather than a percentage applied to gross income.

B The calculations will need to be broken down by the operational risk types defined by the Basel Committee.

C The calculations will need to be broken down by business line.

D The calculations will now need to include a Business Indicator component.

76. Question A risk manager is deciding between buying a futures contract on an exchange and entering into a forward contract directly with a counterparty on the same underlying asset. Both contracts would have the same maturity and delivery specifications. The manager finds that the futures price is lower than the forward price. Assuming no arbitrage opportunity exists, and interest rates are expected to increase, what single factor acting
alone would be a realistic explanation for this price difference?

A The futures contract is less liquid than the forward contract.

B A futures contract offers more flexible terms than a forward contract.

C The price of the underlying asset is strongly negatively correlated with interest rates.

D The upfront transaction cost on the futures contract is higher than that on the forward contract.

77. Question A commodity trader is researching factors that impact the prices of commodity futures contracts. In addition to the supply and demand dynamics, the advisor identifies storage costs, lease rates, and convenience yields as factors that can influence commodity futures prices. Which of the following statements best describes one of these factors?

A Storage cost is the main factor influencing the prices of long-term commodity futures contracts on industrial metals.

B Lease rates on commodities are typically equal to the relevant risk-free interest rate and have a lower bound of zero.

C Storage costs of agricultural commodities cause futures prices to display a mixture of normal and inverted pricing patterns.

D Convenience yield is a charge subtracted from the lease rate by the lender of a commodity.

78. Question A bond fund manager has requested quotes from a bond dealer on two bonds, Bond X and Bond Y, with the same maturity date and coupon rate. The dealer informs the manager that Bond X trades at a spread of 30 bps over the Treasury market, while Bond Y trades at a spread of 70 bps. Which of the following statements is a correct conclusion for the manager to make?

A Bond X earns a lower return than that of the comparable Treasury bond, since its spread serves to increase the discount rate of its cash flows.

B The price of Bond X is currently higher than the price of Bond Y.

C To equate the present value of Bond Y's cash flows to its face value, 70 bps would need to be added to the yield to maturity of a Treasury bond with comparable maturity.

D The spread differential indicates that there is a 0.4% difference in price between Bond X and Bond Y.

79. Question A Swiss chemical company is considering issuing bonds to finance its planned expansion. A risk analyst involved in the capital raising program at the company is studying the external agency rating process to gain a better understanding of the implications of agency ratings for the firm's financing plans. Which of the following statements is correct?

A Agency ratings tend to produce identical default rates for companies in the same industry but located in different countries.

B Empirically, changes in bond and stock prices tend to be greater in cases of ratings downgrades than ratings upgrades.

C Rating agencies produce point-in-time ratings, as these are designed to provide the best current estimate of future default probabilities.

D Rating agencies provide outlooks to indicate the potential for a change in rating in the short-term, and use watchlists to indicate medium-term changes.

80. Question

A portfolio manager at company ABC is examining the company's outstanding FX exposures as of June 1, 2023. The manager decides to hedge a net receivable of EUR 5,000,000 due on December 1, 2023. On June 1, 2023, the EUR spot rate is USD 1.07 per EUR 1, and the 6-month EUR forward rate is USD 1.10 per EUR 1. The manager investigates whether it is better to lock in the exchange rate by taking a position in the forward contract and locking the selling price in 6 months or to sell a 6-month EUR 5,000,000 call option with a strike price of USD 1.07 per EUR 1. Which of the following statements is most likely correct?

A ABC would be better off by selling an option contract regardless of how large the change in the FX rate is and in which direction EUR moves relative to USD.

B ABC would be better off by entering into a forward contract if EUR appreciates against USD by an amount significantly larger than USD 0.03 per EUR 1 and the call option premium is more than 0.03.

C ABC would be better off by entering into a forward contract if EUR appreciates against USD by less than USD 0.03 per EUR 1.

D ABC would be better off by entering into a forward contract if EUR depreciates against USD by an amount significantly larger than USD 0.03 per EUR 1.

81. Question

A derivatives trader wants to price a European-style call option on a stock with a strike price of USD 25.00 and a time to maturity of 6 months. The trader observes that the price of a 6-month European-style put option on the same underlying with a USD 25.00 strike price is USD 3.00. The stock price is USD 26.00. A special one-time dividend of USD 1.00 is expected in 3 months. The continuously compounded risk-free rate for all maturities is 5% per year. Which of the following is closest to the no-arbitrage value of the call option?

A USD 2.37

B USD 3.01

C USD 3.63

D USD 4.62

82. Question

A trader has purchased an asset-or-nothing put option position on 5,000 shares of stock KRP. The stock is currently trading at USD 52 per share. The option has a strike price of USD 49 and a maturity of 1 month. If the price of the stock at expiration is USD 45, which of the following is the best estimate to the payoff of the asset-or-nothing put option position?

A USD 20,000

B USD 35,000

C USD 225,000

D USD 245,000

83. Question A US financial institution entered into a 4-year currency swap contract with an industrial company located in France. Under the terms of the swap, the financial institution receives interest at 3% per year in EUR and pays interest at 2% per year in USD. The principal amounts are EUR 50 million and USD 60 million, and interest payments are exchanged once at the end of each year. Immediately before cash flow payments and receipts are exchanged at the end of year 3, the exchange rate is USD 1.044 per EUR 1, the 1-year risk-free rate in France is 3.0%, and the 1-year risk-free rate in the US is 2.0%. Assuming continuous compounding, what is the value of the swap to the financial institution at the end of year 3?

A USD -7.603 million

B USD -7.445 million

C USD -7.068 million

D USD -6.921 million

84. Question A newly hired quantitative analyst at a financial institution has been asked by a portfolio manager to calculate the VaR of a portfolio for 10-, 15-, 20-, and 25-day periods. The portfolio manager notices something wrong with the analyst's calculations. Assuming the annualized volatilities of daily returns for the four periods are equal, and that the daily returns are independently and identically normally distributed with a mean of zero, which of the following VaR estimates for this portfolio is inconsistent with the others?

A VaR(10-day) = USD 474 million

B VaR(15-day) = USD 503 million

C VaR(20-day) = USD 671 million

D VaR(25-day) = USD 750 million

85. Question A portfolio manager uses a valuation model to estimate the value of a bond portfolio at USD 125.00 million. The term structure is flat. Using the same model, the portfolio manager estimates that the value of the portfolio would increase to USD 127.70 million if all interest rates fall by 20 bps and would decrease to USD 122.20 million if all interest rates rise by 20 bps. Using these estimates, which of the following is the effective duration of the bond portfolio closest to?

A 5.5

B 11.0

C 22.0

D 44.0

86. Question

A portfolio manager is calculating the realized return and the historical volatility of returns for the stock of company VMG. The stock ended the month of June 2021 at a price per share of INR 280, and ended the month of December 2021 at INR 320. The manager reports that the monthly volatility of the stock returns over the 6-month period was 2.76%. Assuming continuous compounding, and that the stock's returns are independent over time, what are the realized return over the 6-month period and the volatility of the stock returns per year?

A The realized return is 12.5%, and the annual volatility is 9.6%.

B The realized return is 12.5%, and the annual volatility is 33.1%.

C The realized return is 26.7%, and the annual volatility is 9.6%.

D The realized return is 26.7%, and the annual volatility is 33.1%.

87. Question

The CRO of a small bank is estimating the volatility of the bank's asset portfolio using its key rate 01s, in preparation for calculating the bank's market risk capital. The portfolio is only exposed to 2-year and 10-year spot rates. Relevant information on market rates and the portfolio is as follows:

	2-year	**10-year**
Standard deviation of daily changes in the spot rate (in bps)	4	11
Correlation between spot rate	0.6	0.6
Portfolio key rate 01s (CAD)	52	97

Given the above information, what is the standard deviation of the daily change in portfolio value?

A CAD 516

B CAD 988

C CAD 1,026

D CAD 1,203

88. Question The CRO of a major bank is reviewing a new risk measure, W, with the risk team. The CRO runs a test on the new risk measure to determine if the measure is coherent and satisfies the property of translation invariance. Which of the following tests would correctly determine that the risk measure W exhibits translation invariance?

A When cash is added to a portfolio, the value of W for that portfolio should decrease by the amount of cash that is added.

B When W is used to measure the risk of two portfolios A and B, then W(A) + W(B) should be less than or equal to W(A+B).

C When W is used to measure the risk of two portfolios A and B, and if portfolio A always produces a worse outcome than portfolio B, then W(A) should always be higher than W(B).

D When W is used to measure the risk of portfolio A, and if all exposures in portfolio A are increased by a constant factor, then W(A) should increase proportionally by that factor.

89. Question On November 1, the fund manager of a USD 60 million US mid-to-large cap equity portfolio, considers locking in the profit from a recent market rally. The S&P 500 Index is trading at 2,110. The S&P 500 Index futures with a multiplier of 250 is trading at 2,120. Instead of selling the holdings, the fund manager would rather hedge two-thirds of the market exposure over the remaining 2 months. Given that the correlation between the equity portfolio and the S&P 500 Index futures is 0.89 and the volatilities of the equity portfolio and the S&P 500 futures are 0.51 and 0.48 per year, respectively, what position should the manager take to achieve the objective?

A Sell 63 futures contracts of the S&P 500 Index

B Sell 67 futures contracts of the S&P 500 Index

C Sell 71 futures contracts of the S&P 500 Index

D Sell 107 futures contracts of the S&P 500 Index

90. Question A bond trader is using current zero rates to calculate forward rates. The trader gathers the following information on the current term structure of continuously compounded zero rates:

Maturity in years	Zero rate (%)
1	1.50
2	2.00
3	2.50
4	3.00
5	3.50

Which of the following is closest to the 2-year forward rate starting in 3 years?

A 3.50%

B 4.17%

C 5.00%

D 6.09%

91. Question A quantitative analyst at a foreign exchange (FX) trading company is developing a new factor model to be used for estimating potential risk exposures on FX trades. The analyst is evaluating potential factors to use in the model, and their effects on the performance of the model. Which of the following statements is most likely correct for the analyst to consider when developing the model?

A Using a large number of underlying factors will allow the model to correctly predict future exchange rates.

B The most important factor in predicting a country's interest rates is the political stability of the country.

C The pair-wise exchange rates for currencies of developed countries can be assumed to be constant for terms shorter than 3 months.

D The value of a country's currency will be negatively correlated with a factor representing changes in that country's money supply.

92. Question

A currency analyst is examining the exchange rate between the USD and the EUR. The analyst observes the following market data:

- Current USD per EUR 1 exchange rate: 1.13
- Current USD-denominated 1-year risk-free interest rate: 2.7% per year
- Current EUR-denominated 1-year risk-free interest rate: 1.7% per year

According to interest rate parity, what is the 2-year forward USD per EUR 1 exchange rate?

A 1.1081

B 1.1190

C 1.1411

D 1.1523

93. Question

Two risk analysts are attending a seminar on the topic of modern portfolio theory. One of the presentations in the seminar focuses on the efficient frontier, the capital market line, and the CAPM. Assuming the CAPM holds, which of the following observations is correct for the analysts to make?

A The capital market line always has a positive slope and its steepness depends on the market risk premium and the volatility of the market portfolio.

B The capital market line is the straight line connecting the risk-free asset with the zero-beta minimum-variance portfolio.

C The portfolio of risky assets with the lowest standard deviation on the efficient frontier is typically held by the least risk averse investors.

D The efficient frontier indicates that different individuals hold different portfolios of risky assets based upon their individual forecasts for asset returns.

94. Question

An analyst at a family endowment fund is studying the use of a factor analysis approach to hedge an investment portfolio. The analyst reviews the characteristics of factor analysis and best practices in implementing the approach. Which of the following statements is correct for the analyst to make?

A Factor betas can be used in the process of hedging idiosyncratic risk, but they cannot be used in hedging systematic risk.

B Choosing the frequency to adjust factor-based hedges requires making a decision that balances the hedging cost and the tracking error.

C Factor hedging performs well when linear factor models are used, but performs poorly when nonlinear factor models are used.

D While an investor can take positions in factors to construct a portfolio with a beta close to zero, the investor cannot theoretically construct a portfolio with a beta exactly equal to zero.

95. Question

The CRO of a bank is evaluating the bank's practices for the management of risk data. The CRO notes that in characterizing various dimensions of the bank's data, the Basel Committee has suggested several principles to promote strong and effective risk data aggregation capabilities. Which statement correctly describes a recommendation that the bank should follow in accordance with the Basel Committee's principles for effective risk data aggregation and risk reporting?

A The integrity principle recommends that data aggregation be completely automated without any manual intervention.

B The completeness principle recommends that a financial institution capture data on its entire scope of material risk exposures.

C The adaptability principle recommends that a bank frequently update its risk reporting systems to incorporate changes in best practices.

D The governance principle recommends that the risk data be reconciled with management's rough approximations of risk exposure prior to aggregating the data.

96. Question

A risk analyst at a growing bank is concerned about a loan exposure to a large manufacturing company which is losing significant market share in its industry. The analyst considers the use of different credit risk transfer mechanisms, including CDS, to manage this exposure. Which of the following statements correctly describes an appropriate benefit of using CDS in this situation?

A CDS quantify the manufacturing company's default risk and allow the bank to monitor changes in this risk on a real-time basis.

B CDS provide an agreement to periodically revalue the loan and transfer any net value change.

C CDS require the manufacturing company to pay back the loan in full at an earlier point in time.

D CDS allow the bank to offset its exposure to the company with loan exposures to other manufacturing companies.

97. Question

An insurance company estimates that 40% of policyholders who have only an auto policy will renew next year, and 70% of policyholders who have only a homeowner policy will renew next year. The company estimates that 80% of policyholders who have both an auto and a homeowner policy will renew at least one of those policies next year. Company records show that 70% of policyholders have an auto policy, 50% of policyholders have a homeowner policy, and 20% of policyholders have both an auto and a homeowner policy. Using the company's estimates, what is the percentage of policyholders that will renew at least one policy next year?

A 29%

B 41%

C 53%

D 57%

98. Question

A risk manager is calculating the VaR of a fund with a data set of 25 weekly returns. The mean weekly return is 7% and the standard deviation of the return series is 15%. Assuming that weekly returns are independent and identically distributed, what is the standard deviation of the mean weekly return?

A 0.4%

B 0.7%

C 3.0%

D 10.0%

99. Question

An analyst is analyzing the historical performance of two commodity funds tracking the Reuters/Jefferies-CRB® Index as benchmark. The analyst collated the data on the monthly returns and decided to use the information ratio (IR) to assess which fund achieved higher returns more efficiently, and presented the findings as shown below:

	Fund 1	Fund 2	Benchmark
Average monthly return	1.488%	1.468%	1.415%
Average excess return	0.073%	0.053%	0.000%
Standard deviation of	0.294%	0.237%	0.238%
Tracking error	0.344%	0.341%	0.000%

What is the information ratio for each fund, and what conclusion can be drawn?

A IR for Fund 1 = 0.212, IR for Fund 2 = 0.155; Fund 1 performed better as it has a higher IR.

B IR for Fund 1 = 0.212, IR for Fund 2 = 0.155; Fund 2 performed better as it has a lower IR.

C IR for Fund 1 = 0.248, IR for Fund 2 = 0.224; Fund 1 performed better as it has a higher IR.

D IR for Fund 1 = 0.248, IR for Fund 2 = 0.224; Fund 2 performed better as it has a lower IR.

100. Question

An analyst is estimating the sensitivity of the return of stock A to different macroeconomic factors. The following estimates for the factor betas are prepared:

$$\beta_{\text{Industrial production}} = 1.30 \quad \beta_{\text{interest rate}} = -0.75$$

Under baseline expectations, with industrial production growth of 3.0% and an interest rate of 1.5%, the expected return for Stock A is estimated to be 5.0%. The economic research department is forecasting an acceleration of economic activity for the following year, with industrial production forecast to grow 4.2% and interest rates increasing 25 bps to 1.75%. According to this forecast, what return of Stock A can be expected for next year?

A 4.8%

B 6.4%

C 6.8%

D 7.8%

2023 FRM Part I Practice Exam #1 – Answer Key

1.	C	26.	A	51.	B	76.	C
2.	A	27.	B	52.	A	77.	C
3.	C	28.	A	53.	D	78.	B
4.	D	29.	B	54.	B	79.	B
5.	C	30.	C	55.	D	80.	D
6.	A	31.	D	56.	C	81.	C
7.	B	32.	D	57.	B	82.	C
8.	C	33.	C	58.	D	83.	B
9.	C	34.	B	59.	B	84.	B
10.	B	35.	D	60.	D	85.	B
11.	D	36.	A	61.	C	86.	C
12.	B	37.	B	62.	A	87.	D
13.	B	38.	D	63.	B	88.	A
14.	A	39.	D	64.	D	89.	C
15.	B	40.	C	65.	A	90.	C
16.	D	41.	D	66.	C	91.	D
17.	A	42.	C	67.	C	92.	D
18.	C	43.	A	68.	D	93.	A
19.	B	44.	C	69.	C	94.	B
20.	C	45.	A	70.	C	95.	B
21.	C	46.	B	71.	C	96.	A
22.	C	47.	B	72.	A	97.	D
23.	D	48.	A	73.	C	98.	C
24.	A	49.	C	74.	A	99.	A
25.	D	50.	B	75.	C	100.	B

1. Question The CFO and CRO at a French property-casualty insurer are discussing the impact recent flooding in Europe is having on their company. They are concerned about a surge in property insurance claims causing the company's regulatory capital to fall below the solvency capital requirement (SCR) prescribed under Solvency II. Which of the following would be a result of this situation?

A The company will be prevented from writing new property-casualty policies.

B A plan to bring capital above the minimum capital requirement must be formulated.

C The company can lower the capital charges assessed for determining the capital requirement by decreasing investment risk.

D A waiver of capital requirements can be granted by the French insurance regulator.

Correct Answer C

Explanation C is correct. Solvency II provides for capital charges for investment risk, underwriting risk, and operational risk. Lowering any of these risks will lower the related capital charges assessed for determining the capital requirement levels.

A is incorrect. An insurer whose capital falls below the minimum capital requirement may be prevented from taking new business.

B is incorrect. The minimum capital requirement is lower than the solvency capital requirement, so breaching the solvency capital requirement may still leave the company above the minimum capital requirement.

D is incorrect. European insurers are regulated by a European Union regulator, not by state regulators.

Section Financial Markets and Products

Learning Objective Evaluate the capital requirements for life insurance and property-casualty insurance companies.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 2. Insurance Companies and Pension Plans.

2. Question

A risk analyst at a hedge fund is conducting a historical simulation to estimate the ES of a portfolio. The value of the portfolio at market close of any given day depends on the price of a stock and the level of an interest rate at the close of that day. The analyst uses closing values of these variables on the most recent 501 trading days as the historical dataset for the simulation and collects the following data, with Day 0 representing the first data point and Day 500 representing the last data point of the historical period:

Day	Stock price (HKD)	Interest rate (%)
0	76.00	2.50%
1	72.00	2.60%
…	…	…
500	94.00	3.80%

What stock price and interest rate would be most appropriate for the analyst to use in the scenario of the historical simulation for Day 501?

A The stock price would be HKD 89.05, and the interest rate would be 3.90%

B The stock price would be HKD 89.05, and the interest rate would be 3.95%

C The stock price would be HKD 92.00, and the interest rate would be 3.90%

D The stock price would be HKD 92.00, and the interest rate would be 3.95%

Correct Answer A

Explanation

A is correct. In a historical simulation with a 500-day historical reference period, the 500 historical daily changes (from Day 0 through Day 500) are used to create 500 scenarios for what might happen between today and tomorrow (on Day 501).

In practice, the risk factors that may be used in a historical simulation are divided into two categories: those where the percentage change in the past is used to define a percentage change in the future, and those where the actual change in the past is used to define an actual change in the future. Stock prices are usually considered to be in the first category, while interest rates are usually considered to be in the second category.

The historical change in the stock price from Day 0 to Day 1 should therefore be measured as a *72 / 76 – 1 = -5.263%* change, while the change in the interest rate should be measured as a *2.60% – 2.50% = 0.10%* change. Applying these changes to the current stock price and interest rate of HKD 94 and 3.8%, respectively, produces a scenario for the historical simulation with a stock price of *94 * (1 – 0.05263) = HKD 89.05263*, and an interest rate of *3.80% + 0.10% = 3.90%*.

B is incorrect. This incorrectly applies the percentage historical change in the interest rate to its current level as follows: ((2.6/2.5) – 1 = 0.04, therefore, scenario interest rate level = 3.80*(1 + 0.04) = 3.952 = 3.95%))

C is incorrect. This applies the actual historical change in the stock price to the current price.

D is incorrect. This applies the actual historical change in the stock price and the percentage historical change in the interest rate to their current values.

Section Valuation and Risk Models

Learning Objective Describe and explain the historical simulation approach for computing VaR and ES.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 2. Calculating and Applying VaR.

3. Question

A risk manager at a bank is speaking to a group of analysts about estimating credit losses in loan portfolios. The manager presents a scenario with a portfolio consisting of two loans and provides information about the loans as given below:

	Loan 1	**Loan 2**
Amount borrowed	CNY 15 million	CNY 20 million
Probability of default	2%	2%
Recovery rate	40%	25%
Default correlation between Loan 1 and Loan 2	0.6	

Assuming portfolio losses are binomially distributed, what is the estimate of the standard deviation of losses on the portfolio?

A CNY 1.38 million

B CNY 1.59 million

C CNY 3.03 million

D CNY 3.36 million

Correct Answer C

Explanation C is correct. The standard deviation of losses (σ_i) for each individual loan is:

$$\sigma_i = \sqrt{p_i - p_i^2}\,[L_i(1 - R_i)]$$

where, p_i represents probability of default (p_1 = 2%, p_2 = 2%), L_i represents exposure at default (amount borrowed) (L_1 = CNY 15 million, L_2 = CNY 20 million), and R_i represents recovery rate (R_1 = 40%, R_2 = 25%)).

Therefore, the standard deviations for loan 1 and loan 2 are:

$$\sigma_1 = \left[\sqrt{0.02 - 0.02^2}\right] * [15(1 - 0.4)] = 1.26$$
$$\sigma_2 = \left[\sqrt{0.02 - 0.02^2}\right] * [20(1 - 0.25)] = 2.1$$

The variance of losses on the portfolio can then be calculated as:

$$\sigma_P^2 = \sum_{i=1}^{n}\sum_{j=1}^{n}\rho_{ij}\sigma_i\sigma_j$$
$$= \sigma_1^2 + \rho_{1,2}\sigma_1\sigma_2 + \rho_{1,2}\sigma_2\sigma_1 + \sigma_2^2$$
$$= 1.26^2 + 2 * 0.6 * 1.26 * 2.1 + 2.1^2$$
$$= 9.1728$$

The standard deviation is therefore $\sqrt{9.1728} = 3.0287$.

A is incorrect. This uses the incorrect formula for standard deviation of losses of the individual loans $\sigma_i = \sqrt{p_i - p_i^2}(L_i * R_i)$.

B is incorrect. This incorrectly assumes portfolio standard deviation of losses to be $\rho_{1,2}\sigma_2\sigma_1$.

D is incorrect. This incorrectly assumes portfolio standard deviation of losses to be the sum of the individual loans' standard deviations of losses.

Section	Valuation and Risk Models
Learning Objective	Estimate the mean and standard deviation of credit losses assuming a binomial distribution.
Reference	Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 6. Measuring Credit Risk.

4. Question

Dutch tulip mania is considered one of the first major financial bubbles. It occurred in 1636-37 when introduction of tulips imported from Turkey generated extremely high demand which led to an astronomical jump in prices. Tulips were first traded as forward contracts, but the government passed laws allowing certain contracts to be transformed to options contracts. Short selling was strictly prohibited.

After the price of tulips rose so high that a single bulb exceeded the cost of an average home, the price collapsed, and many investors went bankrupt. Which of the features of exchange markets listed below would have helped to prevent or mitigate the tulip mania?

A — If Dutch exchanges had allowed only forward contracts, tulip sellers would have been contractually required to pay the full value of the contracts at expiry, which would have minimized speculative trades.

B — By allowing the netting of multiple trades in the portfolio, exchanges help offset the risk from long and short trades, which can decrease potential losses in the portfolio.

C — The main role of an exchange is to enforce payments by counterparties on both sides of the trades, which would have eliminated credit risk for tulip traders.

D — Exchanges offer multiple protection tools that help against counterparty credit risk, but those tools do not protect against economic risk.

Correct Answer: D

Explanation: D is correct, as shown by the dotcom bubble, the sub-prime mortgage bubble or even recent Gamestop stock manipulations.

A is incorrect. The buyers would have been required to pay.

B is incorrect. The losses concentrated on sold tulips and most investors just wanted to sell and were not allowed to short sell to take advantage of elevated prices, which could have helped to stabilize markets.

C is incorrect. The early exchanges already existed; they just didn't offer protection to the members. Credit risk elimination would not help when demand disappears, the problem was not non-payments, but having no one to buy the product.

Section: Financial Markets and Products

Learning Objective: Describe how exchanges can be used to alleviate counterparty risk.

Reference: Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 5. Exchanges and OTC Markets.

5. Question

A credit risk analyst at a wholesale bank is estimating annual default probabilities of a 5-year loan that has just been extended to a corporate borrower. The analyst determines from rating agency data that the 5-year cumulative default probability of bonds from this borrower with identical terms and seniority is 6.2%, and uses this information to calculate the 5-year survival rate for the borrower. If the borrower's average hazard rate for the first 4 years of the loan is 1.1%, what is the unconditional default probability of the borrower during year 5 of the loan?

A 1.71%

B 1.80%

C 1.90%

D 1.98%

Correct Answer C

Explanation C is correct. The unconditional default probability between the end of year 4 and the end of year 5 is calculated as

$$exp\left(-\bar{h}_4 * 4\right) - exp\left(-\bar{h}_5 * 5\right)$$

where $\bar{h}_4$ and $\bar{h}_5$ are the average hazard rates between today and end-of-year 4 and end-of-year 5, respectively. The term

$$exp\left(-\bar{h}_5 * 5\right)$$

in the equation above represents the probability of survival (or survival rate) to the end of year 5. This is equal to one minus the cumulative default probability to the end of year 5, given as 6.2%. Therefore, the 5-year survival rate is

$$1 - 0.062 = 0.938$$

and the unconditional default probability during the fifth year of the loan is

$$exp(-0.011 * 4) - 0.938 = 0.956954 - 0.93800 = \ 0.01895 \ or \ 1.895\%$$

A is incorrect. This incorrectly calculates the survival rate as $exp(-0.062) = 0.939883$, and uses this to calculate the unconditional default probability = 0.956954 – 0.939883 = 0.017071 = 1.71%.

B is incorrect. This incorrectly calculates the unconditional default probability as $0.062 - 4 * 0.011$.

D is incorrect. This is the conditional default probability during the fifth year, or $0.01895/exp(0.011 * 4)$.

Section Valuation and Risk Models

Learning Objective Define and use the hazard rate to calculate the unconditional default probability of a credit asset.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 4. External and Internal Credit Ratings.

6. Question A risk manager at a bank is presenting at a seminar on derivative contracts to a group of newly hired junior analysts. The manager focuses on the features and uses of derivative contracts traded by financial market participants. Which of the following statements, if made by the manager, would be correct regarding these derivative contracts?

A A derivative contract allows a transfer of risks that is beneficial to both parties in the contract.

B Speculators use derivative contracts traded on exchanges, while hedgers use contracts traded in over-the-counter markets.

C Complex derivatives created with mortgages by banks in the years leading up to the 2007 – 2009 global financial crisis limited demand for housing and reduced the severity of the crisis.

D Derivative contracts such as forwards, futures, or options have linear payoff functions that depend on the value of the underlying asset.

Correct Answer A

Explanation A is correct. Derivative contracts do allow risks to be transferred from one party to another in ways that benefit both sides.

B is incorrect. There are speculators and hedgers in both types of markets.

C is incorrect. These complex derivatives increased the availability of mortgages and led to an increase in the demand for housing.

D is incorrect. Forwards and futures have linear payoff functions, but options have non-linear payoff functions.

Section Financial Markets and Products

Learning Objective Define derivatives, describe features and uses of derivatives, and compare linear and non-linear derivatives.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 4. Introduction to Derivatives.

7. Question An analyst wants to price a 6-month futures contract on a stock index. The index is currently valued at USD 750 and the continuously compounded risk-free rate is 3.5% per year. If the stocks underlying the index provide a continuously compounded dividend yield of 2.0% per year, what is the price of the 6-month futures contract?

A USD 744.40

B USD 755.65

C USD 761.33

D USD 763.24

Correct Answer B

Explanation B is correct. The formula for computing the forward price on a financial asset is:

$$F_{0,T} = S_0 * e^{(r-q)T}$$

where S_0 is the spot price of the asset, r is the continuously compounded risk-free interest rate, q is the continuous dividend yield on the asset and T is time until delivery date in years.

The no-arbitrage futures price is computed as follows:

$$F_0 = 750 * e^{(0.035 - 0.02) * 0.5} = 755.65$$

A is incorrect. It is making a mistake in formula as follows: $F_{0,T} = S_0 * e^{(q-r)T} = 750 * e^{(0.02-0.035) * 0.5} = 744.396$

C is incorrect. It is making a mistake in formula as follows: $F_{0,T} = S_0 * e^{(r-q)} = 750 * e^{(0.035-0.02)} = 761.3348$

D is incorrect. It is making a mistake in formula as follows: $F_{0,T} = S_0 * e^{(q)T} = 750 * e^{0.035*0.5} = 763.2405$

Section Financial Markets and Products

Learning Objective Calculate the forward price given the underlying asset's spot price and describe an arbitrage argument between spot and forward prices.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 10. Pricing Financial Forwards and Futures.

8. Question

A portfolio manager is assessing whether the 1-year probability of default of a longevity bond issued by a life insurance company is uncorrelated with returns of the equity market. The portfolio manager creates the following probability matrix based on 1-year probabilities from the preliminary research:

		Longevity bond	
		No default	**Default**
Market returns	**20% increase**	61%	1%
	20% decrease	35%	3%

Given the information in the table, what is the probability that the longevity bond defaults in 1 year given that the market decreases by 20% over 1 year?

A 3.00%

B 4.00%

C 7.89%

D 10.53%

Correct Answer C

Explanation C is correct. Using Bayes' theorem, let A = bond default and let B = 20% decrease in market returns. Then we must solve:

$$P[A|B] = \frac{P[A \cap B]}{P[B]}$$

Using the values from the table, we have $P[A \cap B] = 3\%$ and $P[B] = 35\% + 3\% = 38\%$. Thus,

$$P[A|B] = \frac{0.03}{0.38} = .0789 \rightarrow 7.89\%$$

A is incorrect. It is the probability that the bond defaults and market returns decrease by 20% in 1 year.

B is incorrect. It is the unconditional probability that the bond defaults.

D is incorrect. It uses the unconditional probability that the bond defaults in the numerator of the Bayes' theorem equation:

$$\frac{0.04}{0.38} = 0.1053$$

Section Quantitative Analysis

Learning Objective Explain and apply Bayes' rule.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 1. Fundamentals of Probability.

9. Question

For a sample of 400 firms, the relationship between corporate revenue (Y_i) and the average years of experience per employee (X_i) is modeled as follows:

$$Y_i = \beta_1 + \beta_2 * X_i + \varepsilon_i \quad \text{i = 1, 2 ..., 400}$$

An analyst wants to test the joint null hypothesis that $\beta_1 = 0$ and $\beta_2 = 0$ at the 95% confidence level. The p-value for the t-statistic for β_1 is 0.07, and the p-value for the t-statistic for β_2 is 0.06. The p-value for the F-statistic for the regression is 0.045. Which of the following statements is correct?

A The analyst can reject the joint null hypothesis because each β is different from 0 at the 95% confidence level.

B The analyst cannot reject the joint null hypothesis because neither β is different from 0 at the 95% confidence level.

C The analyst can reject the joint null hypothesis because the F-statistic is significant at the 95% confidence level.

D The analyst cannot reject the joint null hypothesis because the F-statistic is not significant at the 95% confidence level.

Correct Answer: C

Explanation: C is correct. The t-test would not be sufficient to test the joint null hypothesis. In order to test the joint null hypothesis, examine the F-statistic, which in this case is statistically significant at the 95% confidence level. Thus, the joint null hypothesis can be rejected.

A, B, and D are incorrect per the explanation for C above.

Section: Quantitative Analysis

Learning Objective: Construct, apply, and interpret joint hypothesis tests and confidence intervals for multiple coefficients in a regression.

Reference: Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 8. Regression with Multiple Explanatory Variables.

10. Question

The CIO of a global macro fund is assessing the performance of the international portfolio managers of the fund. The CIO gathers the annualized total returns of a sample of the managers as presented in the following table:

Portfolio manager	Annualized total return
1	21%
2	17%
3	11%
4	18%
5	13%

The CIO calculates the central moments of these returns. What is the correct unbiased sample variance of the returns data?

A 0.00128

B 0.00160

C 0.00288

D 0.00360

Correct Answer B

Explanation B is correct. The unbiased estimator for the sample variance is given by:

$$s^2 = \frac{\sum_{i=1}^{n}(X_i - \mu)^2}{n-1}$$

From the values in the table, μ is obtained as (21%+17%+11%+18%+13%)/5 = 16%. Therefore,

$$s^2 = \frac{\sum_{i=1}^{n}(X_i - \mu)^2}{n-1}$$

$$= \frac{(21\% - 16\%)^2 + (17\% - 16\%)^2 + (11\% - 16\%)^2 + (18\% - 16\%)^2 + (13\% - 16\%)^2}{5-1}$$

$$= 0.00160$$

A is incorrect. This is a biased estimate as it divides by n=5 and not by n-1=4.

C is incorrect. This uses a μ that is adjusted with n-1, resulting in 20%, while also dividing the numerator of the sample estimator by 5 and not 4.

D is incorrect. This uses a μ that is adjusted with n-1, resulting in 20%.

Section Quantitative Analysis

Learning Objective Estimate the mean, variance, and standard deviation using sample data.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 5. Sample Moments.

11. Question

A risk manager at an investment company is discussing stock index arbitrage with a group of junior risk analysts. The manager explains why an arbitrage trading strategy is an important factor in the efficient operation of financial markets and how an index arbitrage strategy is implemented. Which of the following statements is correct regarding stock index arbitrage?

A — It involves purchasing one stock index futures contract and selling a different stock index futures contract.

B — It involves purchasing a basket of stocks that are members of an index while selling other stocks in the same index.

C — It ensures that the price of the index will always correspond to the value of a portfolio of the underlying stocks, even if the portfolio is not tradable.

D — It involves selling a stock index futures contract and purchasing the portfolio of stocks underlying the index.

Correct Answer: D

Explanation: D is correct. Stock index arbitrage involves the purchase or sale of a stock index future while simultaneously offsetting this by taking positions in the components of the index.

A is incorrect. This is an example of a long/short trade, a pairs trade, rather than stock index arbitrage.

B is incorrect. This is an example of a long/short trade, or a pairs trade, rather than stock index arbitrage.

C is incorrect. When a portfolio underlying an index is not tradable, it is possible that the price of the index diverges from the value of the underlying index.

Section: Financial Markets and Products

Learning Objective: Calculate the value of a stock index futures contract and explain the concept of index arbitrage.

Reference: Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 10. Pricing Financial Forwards and Futures.

12. Question A risk manager on the derivatives trading desk of an investment bank is monitoring the sensitivity measures for several of the desk's positions in options on stock FIR. The current market price of the stock is USD 60. Which of the following options on stock FIR has the highest gamma?

A Long call option expiring in 5 days with strike price of USD 30

B Long call option expiring in 5 days with strike price of USD 60

C Long call option expiring in 30 days with strike price of USD 30

D Long call option expiring in 30 days with strike price of USD 60

Correct Answer B

Explanation B is correct. Gamma is defined as the rate of change of an option's delta with respect to the price of the underlying asset, or the second derivative of the option price with respect to the asset price. Therefore, the highest gamma is observed in shorter maturity and at-the-money options, since options with these characteristics are much more sensitive to changes in the underlying asset price. The gamma is highest for a shorter maturity call option because delta's move toward either 0 or +1.00 is more imminent.

A, C, and D are incorrect. The option in choice B either has a shorter maturity, is closer to at-the-money, or both.

Section Valuation and Risk Models

Learning Objective Define and describe theta, gamma, vega, and rho for option positions and calculate the gamma and vega for a portfolio.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 16. Option Sensitivity Measures: The "Greeks".

13. Question

An analyst wants to price a 1-year, European-style call option on company REX's stock using the Black-Scholes-Merton (BSM) model. REX announces that it will pay a dividend of USD 1.25 per share on an ex-dividend date 1 month from now and has no further dividend payout plans. The relevant information for the BSM model inputs is in the following table:

Current stock price (S_0)	USD 60
Stock price volatility (σ)	12% per year
Risk-free rate (r)	3.5% per year
Call option exercise price (K)	USD 60
$N(d_1)$	0.570143
$N(d_2)$	0.522623

What is the price of the 1-year call option on the stock?

A USD 2.40

B USD 3.22

C USD 3.97

D USD 4.81

Correct Answer: B

Explanation: B is correct. In the case of no dividends, the value of a European call is equal to:

$$S_0*N(d_1) - K*e^{-rT}*N(d_2)$$

where N is the standard normal cumulative function (and $N(d_1)$ and $N(d_2)$ already account for the expected dividend payment). In the case that dividends are introduced, S_0 in the formula is reduced by the present value of the dividends.

The present value of the dividends = 1.25 * exp(-3.5%*(1/12)) = 1.2464. Thus,

$$S_0 = 60 - 1.2464 = 58.7536$$

$$\text{Call option price} = S_0*N(d_1) - K*e^{-rT}*N(d_2)$$

$$= 58.7536*0.570143 - 60*\exp(-0.035*1)*0.522623 = 33.4978 - 30.2787$$
$$= \text{USD } 3.2191.$$

A is incorrect. USD 2.40 is the value of a European put option on stock REX.

C is incorrect. USD 3.97 is the result when the dividend payment is not accounted for in the formula.

D is incorrect. USD 4.81 is the result obtained if the dividend payment is incorrectly added to the stock price to be paid in 1 year instead of 1 month.

Section: Valuation and Risk Models

Learning Objective	Compute the value of a European option using the Black-Scholes-Merton model on a dividend-paying stock, futures, and exchange rates.
Reference	Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 15. The Black-Scholes-Merton Model.

14. Question

A commodity trader observes that the 6-month forward price of commodity X is USD 1,000. The trader also notes that there is a 6-month zero-coupon risk-free bond with face value USD 1,000 that trades in the secondary fixed-income market. Which of the following strategies creates a synthetic long position in commodity X for a period of 6 months?

A. Buy the forward contract and buy the zero-coupon bond.

B. Buy the forward contract and short the zero-coupon bond.

C. Short the forward contract and buy the zero-coupon bond.

D. Short the forward contract and short the zero-coupon bond.

Correct Answer: A

Explanation: A is correct. A synthetic commodity position for a period of T years can be constructed by entering into a long futures contract with T years to expiration and buying a zero-coupon bond expiring in T years with a face value of the present value of the futures price. The payoff function at time T is as follows:

Payoff from long futures position = $S_T - F_{0,T}$, where S_T is the spot price of the commodity at time T and $F_{0,T}$ is the current futures price.

Payoff from zero coupon bond = $F_{0,T}$

Hence, the total payoff function equals $(S_T - F_{0,T}) + F_{0,T}$ or S_T. This creates a synthetic commodity position.

B, C, and D are incorrect per the explanation for A above.

Section: Financial Markets and Products

Learning Objective: Explain how to create a synthetic commodity position and use it to explain the relationship between the forward price and the expected future spot price.

Reference: Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 11. Commodity Forwards and Futures.

15. Question A portfolio manager bought 600 call options on a non-dividend-paying stock, with a strike price of USD 60, for USD 3 each. The current stock price is USD 62 with a daily stock return volatility of 1.82%, and the delta of the option is 0.5. Using the delta-normal approach to calculate VaR, what is an approximation of the 1-day 95% VaR of this position?

A USD 54

B USD 557

C USD 787

D USD 1,114

Correct Answer B

Explanation B is correct. The delta of the option is 0.5. The 1-day 95% VaR of 1 share of the underlying = 1.82% * 1.645 * 62 = USD 1.8562

Therefore, the VaR of one option is: 0.5 * 1.8562 = USD 0.9281, and multiplying by 600 units provides the 1-day 95% VaR of the entire position: USD 556.86.

A is incorrect. USD 53.8902 is the result obtained by ignoring delta and using the call option price, not stock price, to determine VaR of position: VaR = 0.0182*1.645*600*3 = USD 53.8902.

C is incorrect. USD 787.40 is the result obtained when the VaR of the position is incorrectly calculated at the 99% confidence level (VaR = 0.0182*2.326*62*0.5*600 = USD 787.3975).

D is incorrect. USD 1,113.72 is the result obtained when delta is not applied to the formula (VaR = 1.8562*600 = USD 1,113.72).

Section Valuation and Risk Models

Learning Objective Describe the delta-normal approach and use it to calculate VaR for non-linear derivatives.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 2. Calculating and Applying VaR.

16. Question An operational risk manager is presenting to a group of risk analysts about different techniques to model operational risk. An analyst asks the manager about the appropriate use of the power law in estimating operational losses. Which of the following would be a correct statement for the manager to make about the use of the power law?

A It implies that operational losses tend to follow a normal distribution.

B It is more effective in modeling some types of operational risk, such as losses from fraud, than others, such as losses from natural disasters.

C It is generally used to estimate routine operational losses which occur at a relatively high frequency.

D It is suitable for modeling the tail of the operational loss distribution, but not for modeling the body of the distribution.

Correct Answer D

Explanation D is correct. If *v* is the value of a random variable and *x* is a high value of *v*, then the power law holds it is approximately true that:

$$Pr(v > x) \approx Kx^{-\alpha}$$

where Pr denotes probability and *K* and *α* are parameters. The power law only describes the right tail of the distribution (not the whole distribution). That is why the equation above is approximately true only for high values of *x*.

A is incorrect. Operational losses do not follow a normal distribution, nor does the use of the power law in connection with a random variable suggest that the random variable is normally distributed.

B is incorrect. The power law has been shown to be applicable to a wide range of distributions, relating to events including natural disasters (i.e., the magnitude of earthquakes). The power law is no less appropriate for modeling operational losses from natural disasters than those from fraud or other sources.

C is incorrect. These losses occur in the body of the distribution so are unlikely to be modeled using the power law. These losses are not considered extreme events.

Section Valuation and Risk Models

Learning Objective Explain how to use the power law to measure operational risk.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 7. Operational Risk.

17. Question — A financial analyst is using ordinary least squares (OLS) estimation to explain the behavior of a financial variable. The analyst notes that the proper selection of regressors to include in an OLS estimation is critical to the accuracy of the result. When does omitted variable bias occur?

A — Omitted variable bias occurs when the omitted variable is correlated with an included regressor and is a determinant of the dependent variable.

B — Omitted variable bias occurs when the omitted variable is correlated with an included regressor but is not a determinant of the dependent variable.

C — Omitted variable bias occurs when the omitted variable is independent of an included regressor and is a determinant of the dependent variable.

D — Omitted variable bias occurs when the omitted variable is independent of an included regressor but is not a determinant of the dependent variable.

Correct Answer — A

Explanation — A is correct. Omitted variable bias occurs when a model improperly omits one or more variables that are critical determinants of the dependent variable and are correlated with one or more of the other included independent variables. Omitted variable bias results in an over- or under-estimation of the regression parameters.

B, C, and D are incorrect per the explanation of A above.

Section — Quantitative Analysis

Learning Objective — Describe the consequences of excluding a relevant explanatory variable from a model and contrast those with the consequences of including an irrelevant regressor.

Reference — Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 9. Regression Diagnostics.

18. Question A newly hired treasury risk analyst at a large bank has been assigned to the team responsible for managing the liquidity risk of the bank. The analyst is reviewing the tasks that will be required as part of this function. Which of the following is most likely part of the treasury risk analyst's job duties?

A Building VaR models

B Purchasing credit default swaps

C Implementing asset-liability management

D Estimating loss given default

Correct Answer C

Explanation C is correct. Asset-liability management is a process used in managing banks' funding liquidity risk, with techniques including gap and duration analysis. This is important because maturity mismatches on banks' balance sheets (for example, if a bank funds longer-term loans using short-term deposits) can create risk for a bank if short-term interest rates rise faster than longer term rates.

A is incorrect. Model risk managers/developers are responsible for building VaR models. VaR models are used to manage market risk.

B is incorrect. Credit default swaps are used to hedge against counterparty risk, which is a form of credit risk.

D is incorrect. Estimating loss given default is used to quantify credit risk.

Section Foundations of Risk Management

Learning Objective Evaluate, compare, and apply tools and procedures used to measure and manage risk, including quantitative measures, qualitative risk assessment techniques, and enterprise risk management.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 1. The Building Blocks of Risk Management.

19. Question A junior analyst has just started working for a national banking supervisor and is training for a position as a bank examiner. As part of the training program, the analyst is asked to explain how banking regulations evolved as a result of the 2007 – 2009 financial crisis to encourage better risk governance. Which of the following correctly describes an impact of regulations that were introduced as a result of the crisis?

A Banks were required to securitize all the mortgages they originate in order to distribute risk across financial institutions.

B Banks were encouraged to establish an independent risk management function with access to the board of directors.

C Proprietary trading operations were merged with traditional banking operations to provide banks better governance over their trading desks.

D Derivatives were encouraged to be traded OTC rather than centrally cleared to provide greater transparency.

Correct Answer B

Explanation B is correct. One of the key governance recommendations is that banks should establish an independent risk management function with access to the board of directors. This prevents the risk function from being suppressed, as it would be if it was subordinate to other divisions such as trading operations, and ensures that the board is advised of risk issues.

A is incorrect. Securitization was a key contributor to the crisis, as many tranches of securitized mortgages had very high credit ratings but collapsed during the crisis as investors and rating agencies underestimated the potential for all the mortgages in a securitization to go down together. Post-crisis governance did not encourage increased securitization.

C is incorrect. Dodd-Frank's Volcker rule, for example, prohibited banks from proprietary trading, and around the world many trading operations were required to be (or were voluntarily) divested from banking operations.

D is incorrect. Post-crisis regulation encouraged central clearing when possible.

Section Foundations of Risk Management

Learning Objective Explain changes in regulations and corporate risk governance that occurred as a result of the 2007-2009 financial crisis.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 3. The Governance of Risk Management.

20. Question A newly hired risk analyst at a bank is a certified FRM. The analyst is reviewing the bank's policies and procedures related to employee conduct and notices areas where they conflict with the GARP Code of Conduct. Which of the following is a potential consequence of violating the GARP Code of Conduct once a formal determination is made that such a violation has occurred?

A Formal notification of a violation sent to the GARP Member's employer

B Suspension of the GARP Member's right to work in the risk management profession

C Removal of the GARP Member's right to use the FRM designation

D Required participation by the GARP Member in ethics training

Correct Answer C

Explanation C is correct. According to the GARP Code of Conduct, "violation(s) of this Code may result in, among other things, the temporary suspension or permanent removal of the GARP Member from GARP's Membership roles, and may also include temporarily or permanently removing from the violator the right to use or refer to having earned the FRM designation or any other GARP granted designation, following a formal determination that such a violation has occurred."

A, B, and D are incorrect. The GARP Code of Conduct does not state that these consequences would result from a violation.

Section Foundations of Risk Management

Learning Objective Describe the potential consequences of violating the GARP Code of Conduct.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 11. GARP Code of Conduct.

21. Question

A risk manager at a major global bank is conducting a time series analysis of equity returns. The manager wants to know whether the time series is covariance stationary. Which of the following statements describes one of the requirements for a time series to be covariance stationary?

A The distribution of a time series should have a kurtosis value near 3.0, ensuring no fat tails will distort stationarity.

B The distribution of a time series should have a skewness value near 0, so that its mean will fall in the center of the distribution.

C The autocovariance of a covariance stationary time series depends only on the lag, h, between observations, not on time.

D When the autocovariance function is asymmetric with respect to lag, h, forward looking stationarity can be achieved.

Correct Answer: C

Explanation: C is correct. One requirement for a series to be covariance stationary is that its covariance structure be stable over time. If the covariance structure is stable, then the autocovariances depend only on the lag, h, between observations, not on time, t.

A and B are incorrect. Covariance stationarity does not place restrictions on other aspects of the distributions or the series, such as kurtosis and skewness.

D is incorrect. Covariance stationarity does not depend on the symmetry of the autocovariance function.

Section: Quantitative analysis

Learning Objective: Describe the requirements for a series to be covariance stationary.

Reference: Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 10. Stationary Time Series.

22. Question A risk manager at a pension fund is analyzing the risk profile of several of the fund's portfolios. The portfolios are invested in different asset classes and have the same current market value. Which of the following portfolios would likely have the highest potential level of unexpected loss during a sharp broad-based downturn in financial markets?

A A portfolio of US Treasury notes with 2 to 5 years to maturity

B A portfolio of long stock positions in an international large cap stock index combined with long put options on the same index

C A portfolio of mezzanine tranche MBS structured by a large regional bank

D A short position in futures for industrial commodities such as copper and steel

Correct Answer C

Explanation C is correct. The portfolio of mortgage-backed securities would have the highest unexpected loss since the securities should have the highest correlation (covariance) and should have the most risk of moving downward simultaneously in a crisis situation.

Section Foundations of Risk Management

Learning Objective Distinguish between expected loss and unexpected loss and provide examples of each.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 1. The Building Blocks of Risk Management.

23. Question A start-up company is undergoing a series of operational changes. The company expects to receive a round of equity capital to finance its growth strategies. A risk manager at the company is evaluating the risk of the company as well as the company's new capital structure. The manager notes that the company has decided to switch its business focus to riskier projects upon receiving the equity funding. Which of the following is most likely correct for the manager to conclude once the funding completes and the new projects are undertaken?

A The company's risk capacity will decrease and its risk appetite will increase.

B The company's risk capacity will increase and its risk appetite will decrease.

C Both the company's risk capacity and risk appetite will remain the same.

D Both the company's risk capacity and risk appetite will increase.

Correct Answer D

Explanation D is correct. Since the company receives a round of equity funding, the company's capital increases and thus increases its risk capacity. Since the company will switch its focus to riskier projects, it adjusts the amount and type of risk the company is willing to accept, which increases risk appetite.

A is incorrect. The company's risk capacity will increase as well.

B is incorrect. The risk appetite will increase as well.

C is incorrect. Both the company's risk capacity and risk appetite will increase.

Section Foundations of Risk Management

Learning Objective Explain the relationship between risk appetite and a firm's risk management decisions.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 2. How Do Firms Manage Financial Risk?

24. Question A risk consultant is presenting to a group of junior risk managers on how risk management failures contributed to financial disasters. The consultant focuses on the lessons learned from examining historical financial disasters in the US and around the world. Which of the following correctly describes a lesson learned from the given case?

A The Orange County case emphasizes the importance of fully understanding complex derivative contracts before entering into them.

B The London Whale case emphasizes the importance of recognizing that correlations can increase sharply during a global financial crisis.

C The Northern Rock case emphasizes the importance of having a strong cybersecurity framework.

D The LTCM case emphasizes the importance of meeting regulatory capital requirements.

Correct Answer A

Explanation A is correct. Orange County imploded when Robert Citron made a large bet on inverse floating swaps, which was not fully understood by the county's board of directors, and blew up when interest rates rose. Citron later admitted that he did not understand either the position that he took or the risk exposure of the fund.

B is incorrect. Poor correlation modeling was more a central theme of the subprime crisis or Long Term Capital Management (although the LTCM incident did not occur during a crisis.) The London Whale case took place in 2012, well after the end of the crisis, and its main themes were poor corporate governance with respect to risk concentration limits, position limits and VaR models.

C is incorrect. This refers to the SWIFT case. The Northern Rock case was a run on the bank which occurred partly due to an overreliance on repurchase agreements and liquidity risk when repo financing dried up.

D is incorrect. The LTCM case was a case of incorrect correlation modeling and inadequate stress testing. As a hedge fund, LTCM was not covered by regulatory capital requirements at the time.

Section Foundations of Risk Management

Learning Objective Analyze the key factors that led to and derive the lessons learned from case studies involving the following risk factors:

- Funding liquidity risk, including Lehman Brothers, Continental Illinois, and Northern Rock.
- Model risk, including the Niederhoffer case, Long Term Capital Management, and the London Whale case.
- Financial engineering and complex derivatives, including Bankers Trust, the Orange County case, and Sachsen Landesbank.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 9. Learning from Financial Disasters.

25. Question

An analyst is evaluating the performance of a portfolio of Mexican equities that is benchmarked to the IPC Index. The analyst collects the information about the portfolio and the benchmark index, shown below:

Expected return of the portfolio	8.7%
Volatility of returns of the portfolio	12.0%
Expected return of the IPC	4.0%
Volatility of returns of the IPC	8.7%
Risk-free rate of return	2.0%
Beta of portfolio relative to IPC	1.4%

What is the Sharpe ratio of this portfolio?

A 0.036

B 0.047

C 0.389

D 0.558

Correct Answer D

Explanation D is correct. The Sharpe ratio for the portfolio is:

$$\frac{Expected\ return\ of\ portfolio - Risk\ free\ rate}{Volatility\ of\ returns\ of\ portfolio} = \frac{8.7\% - 2.0\%}{12.0\%} = 0.5583$$

Section Foundations of Risk Management

Learning Objective Calculate, compare, and interpret the following performance measures: the Sharpe performance index, the Treynor performance index, the Jensen performance index, the tracking error, information ratio, and Sortino ratio.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 5. Modern Portfolio Theory and the Capital Asset Pricing Model.

26. Question

A risk manager asks a junior risk analyst to assess the prepayment risk on a pool of fixed-rate mortgages. In order to calculate the conditional prepayment rate (CPR) for the pool, the analyst begins by estimating the monthly prepayments on one selected mortgage. At origination, the 30-year mortgage was a USD 1,750,000 loan making monthly mortgage payments at a fixed mortgage rate of 8% per year. Assuming the borrower made a total payment on the mortgage of USD 15,950.00 in one specific month, and the loan balance at the beginning of that month was USD 1,644,235.78, what is the correct estimate of the prepayment amount for that month?

A USD 3,060.29

B USD 4,933.62

C USD 11,016.38

D USD 14,076.60

Correct Answer A

Explanation

A is correct. Prepayment for any given month is defined as “principal payment” in excess of “scheduled principal payment” and is computed as:

(i) month’s total payment, less
(ii) month’s scheduled interest payment, less
(iii) month’s scheduled principal payment.

or,

(i) month’s total payment, less
(ii) month’s scheduled total payment

To compute scheduled total payment, consider an amortizing fixed-rate loan with particulars as follows: PV = 1,750,000; N = 12x30 = 360; FV = 0; I/Y = 8%/12 = 0.67. Therefore, using a calculator, PMT = 12,889.71 = constant scheduled total payment per month.

Therefore, prepayment in the specified month = total payment made – scheduled total payment = 15,950.00 – 12,889.71 = USD 3,060.29.

(Also, given the specified month, Interest payment = 0.67% * beginning balance = 0.0067 * 1,644,235.78 = USD 11,016.38)

B is incorrect. USD 4,933.62 is the total payment less scheduled interest payment for the month. It is incorrect because it includes the scheduled principal payment.

C is incorrect. USD 11,016.38 is the scheduled interest payment for the month = 0.0067 * 1,644,235.78.

D is incorrect. USD 14,076.60 is the total payment made less the scheduled principal payment for the month = USD 15,950.00 – (12,889.71 – 11,016.38). It is incorrect because it includes the scheduled interest payment.

Section Financial Markets and Products

Learning Objective	Calculate a fixed-rate mortgage payment and its principal and interest components.
Reference	Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 18. Mortgages and Mortgage-Backed Securities.

27. Title

A risk manager at a civil service pension scheme is conducting a year-end review on the disbursement preferences of 100 retirement plan beneficiaries and observes the following:

- 57 beneficiaries have opted to receive monthly disbursements.
- 43 beneficiaries have opted to receive a lump-sum payment.
- In addition, 24 of the beneficiaries that have opted to receive monthly disbursements will also receive a lump-sum payment after a period of time.

If a retirement plan beneficiary selected at random from this sample has opted for monthly disbursements, what is the probability that the beneficiary will also receive a lump-sum payment?

A 24%

B 42%

C 50%

D 56%

Correct Answer B

Explanation B is correct.

Recall that for conditional probabilities, $P(A \mid B) = P(A \cap B) / P(B)$.
Thus, if we set
A = opted for monthly disbursements
B = opted for a lump-sum payment

$P(B \mid A) = P(B \cap A) / P(A) = 0.24/0.57 = 0.4211$ or approx. 42%

A is incorrect. This is just $P(B \cap A)$.

C is incorrect. This is the average of P(A) and P(B).

D is incorrect. This is the value of $P(B \cap A) / P(B)$.

Section Quantitative Analysis

Learning Objective Define and calculate a conditional probability.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 1: Fundamentals of Probability.

28. Question

An analyst is testing a hypothesis that the beta, β, of stock CDM is 1. The analyst runs an ordinary least squares regression of the monthly returns of CDM, R_{CDM}, on the monthly returns of the S&P 500 Index, R_m, and obtains the following relation:

$$R_{CDM} = 0.86R_m - 0.32$$

The analyst also observes that the standard error of the coefficient of R_m is 0.80. In order to test the hypothesis H_0: $\beta = 1$ against H_1: $\beta \neq 1$, what is the correct statistic to calculate?

A t-statistic

B Chi-squared test statistic

C Jarque-Bera test statistic

D Sum of squared residuals

Correct Answer: A

Explanation: A is correct. The t-statistic is defined by:

$$t = \frac{\beta^{estimated} - \beta}{SE_{(estimated\ \beta)}} = \frac{0.86 - 1}{0.8} = -0.175$$

In this case t = -0.175. Since |t| < 1.96 we cannot reject the null hypothesis.

B, C, and D are incorrect. Tests of a hypothesis about a regression parameter are implemented using a t-test.

Section: Quantitative Analysis

Learning Objective: Construct, apply, and interpret hypothesis tests and confidence intervals for a single regression coefficient in a regression.

Explain the steps needed to perform a hypothesis test in a linear regression.

Reference: Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 7. Linear Regression.

29. Question

A data analyst at a large bank is assessing the valuation of a unique stock option with few known properties. The analyst is considering using simulation to model the option's potential value. The analyst considers whether to use Monte Carlo simulation or bootstrapping to conduct the analysis. Which of the following statements about bootstrapping is correct?

A Data used for bootstrapping must follow a standard normal distribution.

B Data used for bootstrapping must be resampled with replacement.

C Data used for bootstrapping must come from a variable with known properties.

D Data used for bootstrapping must be resampled such that all possible outcomes in a probability space are present.

Correct Answer: B

Explanation: B is correct. In bootstrapping, data are resampled with replacement in order to empirically estimate the sampling distribution.

A is incorrect. One advantage of bootstrapping over Monte Carlo simulation is that the data does not have to follow any distribution.

C is incorrect. Same explanation as A.

D is incorrect. This would be ideal but not always possible.

Section: Quantitative Analysis

Learning Objective: Describe the bootstrapping method and its advantage over Monte Carlo simulation.

Reference: Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 13. Simulation and Bootstrapping.

30. Question A risk analyst is assessing the correlation between the returns of two financial assets. The analyst wants to determine if the two sets of returns are dependent. Which of the following is correct regarding correlation and dependence?

A Returns on financial assets tend to be independent.

B Pearson's correlation measures both linear and nonlinear dependence.

C Correlation and the regression slope are closely related.

D If the returns of the two assets are normally distributed, their rank correlation and Pearson's correlation would not be equal.

Correct Answer C

Explanation C is correct. Correlation and the slope of the regression are intimately related, as regression explains the sense in which correlation measures linear dependence.

A is incorrect. Financial assets are highly dependent and exhibit both linear and nonlinear dependence.

B is incorrect. Pearson's correlation only measures linear dependence.

D is incorrect. The rank correlation is virtually identical to the Pearson's (also known as linear) correlation for normal random variables.

Section Quantitative Analysis

Learning Objective Define correlation and covariance and differentiate between correlation and dependence.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 12. Measuring Returns, Volatility, and Correlation.

31. Title — A senior trader on the fixed-income trading desk of an investment bank is presenting to a group of newly hired analysts on key drivers of credit risk. The trader illustrates the concept of recovery rates using a scenario of a bank buying a corporate bond. Which of the following would the trader be correct to identify as an example of a corporate bond that is held by the bank and has a recovery rate of 35%?

A — If the corporate issuer becomes insolvent, liquidation of the issuer's assets would result in the bank receiving 35% of the price it initially paid for the bond.

B — If the corporate issuer defaults on a collateralized bond, the bank would take possession of an amount of collateral valued at 65% of the bond's face value.

C — At the time the bank purchases the bond, there is a 65% unconditional probability that the corporate issuer will not make full and timely payments on the bond.

D — If the corporate issuer defaults on the bond, the value of the bond shortly after default is expected to equal 35% of the bond's par value.

Correct Answer — D

Explanation — D is correct. The recovery rate for a bond is usually defined as the value of the bond shortly after default and it is expressed as a percentage of its face (par) value. It can be thought of as the amount of the obligation the lender can expect to recover if the firm defaults.

A is incorrect. This would correspond to a 35% recovery rate if, in the event of bankruptcy, liquidation of the firm's assets would result in the bank receiving 35% of the face value of the bond.

B is incorrect. This would correspond to a 35% recovery rate if, given that a collateralized bond defaults, the bank would take possession of collateral valued at 35% of the bond's face value.

C is incorrect. Recovery rate is defined as described in the explanation for D above, and is a conditional probability (conditional on a default occurring).

Section — Valuation and Risk Models

Learning Objective — Define recovery rate and calculate the expected loss from a loan.

Reference — Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 4. External and Internal Credit Ratings.

32. Question A financial institution is planning to add stressed VaR to the measures it uses to assess market risk. In preparation for this development, a risk analyst at the institution researches the differences between stressed VaR and traditional VaR, including the appropriate data, time horizons, and distributions. Which of the following is a major characteristic of stressed VaR that distinguishes it from traditional VaR?

A Stressed VaR is based on an unconditional loss distribution rather than a conditional loss distribution.

B Stressed VaR typically uses much longer time horizons, often several months or years.

C Stressed VaR uses a different assumed probability distribution as an input compared to traditional VaR.

D Stressed VaR is not necessarily based on data from the immediately preceding period, unlike traditional VaR.

Correct Answer D

Explanation D is correct. VaR is traditionally calculated using data from the period immediately preceding the analysis. In stressed VaR, however, this data is gathered from a particularly stressful period in the past, which would not necessarily include the immediately preceding period.

A is incorrect. Stressed VaR produces a conditional loss distribution and is a conditional risk measure.

B is incorrect. Typically, the time horizon for stressed VaR is a short period (i.e., one to ten days).

C is incorrect. Stressed VaR is calculated from historical data, rather than assuming a probability distribution of losses.

Section Valuation and Risk Models

Learning Objective Describe stressed VaR and stressed ES, including their advantages and disadvantages, and compare the process of determining stressed VaR and ES to that of traditional VaR and ES.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 8. Stress Testing.

33. Question A derivatives trader is determining the bounds for prices of several options on a stock. The current share price of the stock is USD 100.00, and the continuously compounded risk-free rate is 12% per year. What are the upper bounds for the prices of a 3-month European-style call option, American-style call option, European-style put option, and American-style put option, respectively, if the strike price for each option is USD 90.00?

A USD 97.04; USD 97.04; USD 87.34; USD 87.34

B USD 97.04; USD 100.00; USD 90.00; USD 90.00

C USD 100.00; USD 100.00; USD 87.34; USD 90.00

D USD 100.00; USD 100.00; USD 90.00; USD 90.00

Correct Answer C

Explanation C is correct. For European and American call options, the maximum possible price is equal to current stock price. The option price can never be higher than the stock price. The stock price is thus the “upper bound.” For a European Put, the upper bound is the present value of the strike price, while for an American put, it is equal to the strike price.

A is incorrect. This incorrectly gives the upper bound for the European and American call options as the present value of the current stock price, and incorrectly gives the upper bound for the American put option as the present value of the strike price.

B is incorrect. This incorrectly gives the upper bound for the European call option as the present value of the current stock price, and incorrectly gives the upper bound for the European put option as the strike price.

D is incorrect. This incorrectly gives the upper bound for the European put option as the strike price.

Section Financial Markets and Products

Learning Objective Identify and compute upper and lower bounds for option prices on non-dividend and dividend paying stocks.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 13. Properties of Options.

34. Question An option trader at an equity hedge fund is assessing the cost structure of the fund's portfolio of options. The trader examines the types of positions the fund trades with its prime brokers and investigates whether the fund can reduce the upfront costs of its option positions. How can the trader transform a long option into a zero-cost derivative product?

A Arranging with the option seller to pay an amount equal to the upfront option premium at maturity rather than at option initiation

B Entering into an agreement to purchase the payoff of the option at maturity for an amount equal to the future value of the current option premium

C Combining the purchase of the option with a sale of other options such that the net premium is zero and the combined payoff is identical to the payoff of the original option

D Purchasing the option and selling the underlying stock such that the net upfront cash flow is zero and the payoff is identical to the payoff of the original option

Correct Answer B

Explanation B is correct. This describes the process that transforms a regular upfront premium option into a zero-cost derivative product. The option purchaser essentially agrees to buy the option payoff for a premium equal to the future value of the upfront option premium.

A is incorrect. The option buyer would not be able to pay the same premium at maturity as they would at option initiation. The premium would be increased by an interest charge.

C is incorrect. A single option can be packaged with other options to make the net premium zero but the payoff will not remain identical. Generally, there is a trade-off involving the cost of the position and the payoff of the position. For example, if the payoff of a call could be structured with a package of options resulting in no cost, there would be no need for outright calls. This is not the process described to make any derivative a zero-cost product.

D is incorrect. It is not going to have the same payoff.

Section Financial Markets and Products

Learning Objective Explain how any derivative can be converted into a zero-cost product.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 15. Exotic Options.

35. Question A fixed-income trader recently joined a large bank that acts as a dealer in the sovereign bonds of several countries. The trader researches the differences between a country's foreign currency sovereign bonds and its local currency sovereign bonds, including the differences in their default risk and investor demand. Which of the following would the trader find to be correct?

A A country's foreign currency debt rating is typically higher than its local currency debt rating.

B Investors in foreign currency sovereign bonds typically lose the entire value of their investment upon a country's default, whereas investors in local currency bonds do not.

C Debt issued in foreign currency is usually sold to investors based in the issuing country.

D Printing money to pay its local currency debt can be useful for a country in the short term, but can result in serious economic consequences in the long term.

Correct Answer D

Explanation D is correct. In the case of being in danger of a default on local currency bonds, printing money is likely to be attractive in the short term because a country's reputation and credit rating will not immediately suffer. However, printing money debases the currency and leads to inflation in the longer term.

A is incorrect. The local currency rating of a country is typically one or two notches higher than the foreign currency rating.

B is incorrect. Most of the recent instances of foreign currency sovereign default involved the exchange of old bonds for new bonds with some net present value loss to lenders.

C is incorrect. Debt issued in a foreign currency is often purchased by global banks and other international lenders.

Section Valuation and Risk Models

Learning Objective Compare instances of sovereign default in both foreign currency debt and local currency debt and explain common causes of sovereign defaults.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 5. Country Risk: Determinants, Measures, and Implications.

36. Question

Bank A and Bank B are two competing investment banks. The banks are calculating the 1-day 99% VaR for a long position in an at-the-money call option on a non-dividend-paying stock with the following information:

- Current stock price: USD 120
- Estimated annual stock return volatility: 18%
- Current Black-Scholes-Merton call option value: USD 5.20
- Call option delta: 0.6

To compute VaR, Bank A uses the delta-normal model, while Bank B uses a Monte Carlo simulation method for full revaluation. Which bank will estimate a higher value for the 1-day 99% VaR?

A Bank A

B Bank B

C Both banks will have the same VaR estimate

D Insufficient information to determine

Correct Answer: A

Explanation: A is correct. The option's price function is convex with respect to the value of the underlying. However, for such a non-linear portfolio, the delta-normal model provides only a linear approximation which does not capture the positive effect of this curvature on the portfolio value. Therefore, the delta-normal model will overstate the probability of low option values, and the VaR will always be higher under the delta-normal model than a full revaluation conducted by Monte Carlo simulation analysis.

B, C, and D are incorrect per the explanation for A above.

Section: Valuation and Risk Models

Learning Objective: Describe the delta-normal approach and use it to calculate VaR for non-linear derivatives.

Explain the structured Monte Carlo method for computing VaR and identify its strengths and weaknesses.

Reference: Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 2. Calculating and Applying VaR.

37. Question

A currency derivatives trader at a hedge fund is describing the mechanics of currency swaps to a group of junior analysts. The trader uses an example of a fixed-for-fixed USD for CNY currency swap with the following terms:

- Notional amount in USD: USD 10 million
- Notional amount in CNY: CNY 65 million
- Interest rate in USD: 1.0%
- Interest rate in CNY: 2.5%
- Time to maturity: 4 years
- Frequency of interest payments: Annual

Assuming the hedge fund receives interest in CNY, which of the following conclusions would the analysts find to be most likely correct?

A Interest payments will be exchanged periodically for the duration of the swap, but the notional amounts will not be exchanged.

B The hedge fund will pay CNY 65 million and receive USD 10 million at the initiation of the swap.

C The swap is structured to have a positive mark-to-market value for the hedge fund at the initiation of the swap.

D Holding all else constant, if the CNY depreciates against the USD, the mark-to-market value of the swap will increase for the hedge fund.

Correct Answer: B

Explanation: B is correct. With a currency swap, the notional amounts are exchanged in an opposite direction from the interest rate payments at the initiation of the swap. Therefore, if the hedge fund is collecting interest in CNY, it will pay CNY 65 million and receive USD 10 million at the initiation of the swap.

A is incorrect. Unlike an interest rate swap, the principal amounts are actually exchanged at the initiation of a currency swap.

C is incorrect. The swap will typically have a zero mark-to-market value upon initiation.

D is incorrect. Since the hedge fund initially pays CNY and receives USD, at the end of the swap the fund will pay USD and receive CNY. If the CNY depreciates in the meantime, the fund would receive less on settlement than it would have if it simply converted the USD to CNY in the spot market, so the mark-to-market value would decrease.

Section: Financial Markets and Products

Learning Objective: Explain the mechanics of a currency swap and compute its cash flows.

Reference: Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 20. Swaps.

38. Question

A junior analyst at a banking supervisory agency is taking an internal training class on the Vasicek model. The analyst reviews the following equations related to the model:

$$U_i = aF + \sqrt{1 - a^2 Z_i}$$

$$Default\ rate\ as\ a\ function\ of\ F = N\left(\frac{N^{-1}(PD) - aF}{\sqrt{1 - a^2}}\right)$$

Which of the following statements regarding the Vasicek model is correct?

A The default probabilities of the individual loans in a portfolio are each mapped to the standard normal distribution U_i, of which values in the extreme right tail represent default.

B A low value of the factor *F* indicates that the economy is strong, while a high value of *F* represents economic weakness.

C For corporate borrowers, the value of the factor *F* is higher for loans to companies with more cyclical businesses.

D The model coefficient a directly relates to the correlations between the default probability distributions U_i of the loans in the portfolio.

Correct Answer: D

Explanation: D is correct. The correlation between each pair of U_i distributions is equal to a^2.

A is incorrect. The default probabilities are each mapped to the standard normally distributed variable U_i, however, values in the extreme left tail represent default. As such, low values of *F* or Z_i correspond with a higher likelihood of default.

B is incorrect. High values of *F* indicate a strong economy, and low values of *F* indicate a weak economy. As such, low values of *F* correspond with a higher likelihood of default.

C is incorrect. *F* is a common factor and is equal for all loans in the portfolio.

Section: Valuation and Risk Models

Learning Objective: Describe and apply the Vasicek model to estimate default rate and credit risk capital for a bank.

Reference: Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 6. Measuring Credit Risk.

39. Question — Pear, Inc. is a manufacturer that is heavily dependent on plastic parts shipped from Malaysia. Pear wants to hedge its exposure to plastic price shocks over the next 7.5 months. Futures contracts, however, are not readily available for plastic. After some research, Pear identifies futures contracts on other commodities whose prices are closely correlated to plastic prices. Futures on Commodity A have a correlation of 0.85 with the price of plastic, and futures on Commodity B have a correlation of 0.92 with the price of plastic. Futures on both Commodity A and Commodity B are available with 6-month and 9-month expirations. Ignoring liquidity considerations, which contract would be the best to minimize basis risk?

A — Futures on Commodity A with 6 months to expiration

B — Futures on Commodity A with 9 months to expiration

C — Futures on Commodity B with 6 months to expiration

D — Futures on Commodity B with 9 months to expiration

Correct Answer — D

Explanation — D is correct. In order to minimize basis risk, one should choose the futures contract with the highest correlation to price changes, and the one with the closest maturity, preferably expiring after the duration of the hedge.

A, B, and C are incorrect per the explanation for D above.

Section — Financial Markets and Products

Learning Objective — Define and calculate the basis, discuss various sources of basis risk, and explain how basis risks arise when hedging with futures.

Reference — Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 8. Using Futures for Hedging.

40. Question

A fixed-income portfolio manager currently holds a bullet 7-year US Treasury position with USD 60 million face value. The manager would like to create a cost matching barbell portfolio by purchasing a combination of a 2-year Treasury and a 15-year Treasury that would have the same duration as the 7-year US Treasury position. The data for the three US Treasuries are listed below:

Maturity	Price	Duration
2 years	100.972	1.938
7 years	106.443	6.272
15 years	122.175	11.687

Which of the following combinations correctly describes the weights of the two bonds that the manager will use to construct the barbell portfolio?

	Weight of 2-Year Treasury	Weight of 15-Year Treasury
A	14.22%	85.78%
B	44.46%	55.54%
C	55.54%	44.46%
D	85.78%	14.22%

Correct Answer: C

Explanation: C is correct. To construct a barbell portfolio with the same cost and same duration as the bullet:

$$\text{Cost of bullet} = (106.443/100)*\text{USD } 60{,}000{,}000 = \text{USD } 63{,}865{,}800$$

If V_2 and V_{15} are values (costs) of the 2-Year and 15-Year Treasuries, respectively, then,

$$V_2 + V_{15} = \text{USD } 63{,}865{,}800 \quad \ldots\ldots (1)$$

Therefore, to match duration:

Duration of bullet = weighted-average duration of 2-year and 15-year Treasuries

$$6.272 = (V_2/63{,}865{,}800)*1.938 + (V_{15}/63{,}865{,}800)*11.687 \quad \ldots\ldots (2)$$

From Equation (1), $V_2 = 63{,}865{,}800 - V_{15}$.

Then, Equation (2) becomes:

$$6.272 = [(63{,}865{,}800 - V_{15})/63{,}865{,}800)]*1.938 + (V_{15}/63{,}865{,}800)*11.687$$

$$400{,}566{,}297.6 = 123{,}771{,}920.4 - 1.938V_{15} + 11.687V_{15}$$

$$276{,}794{,}377.2 = 9.749V_{15}$$

And so, $V_{15} = \text{USD } 28{,}392{,}078.90$

And so, $V_2 = 63,865,800 – V_{15} = 63,865,800 – 28,392,078.90 = USD\ 35,473,721.10$

Giving weight of 2-Year Treasury

$$= 35,473,721.10/63,865,800 = 55.54\%$$

And weight of 15-year Treasury

$$= 28,392,078.90/63,865,800 = 44.46\%$$

A is incorrect. It incorrectly calculates the weights based on duration as: weight of 2-Year T = 1.938/(1.938 + 11.687) = 14.22%; and weight of 15-year T = 1 – 0.1422 = 85.78%.

B is incorrect. It switches the weights derived in C above.

D is incorrect. It switches the weights explained in A above.

Section	Valuation and Risk Models
Learning Objective	Construct a barbell portfolio to match the cost and duration of a given bullet investment and explain the advantages and disadvantages of bullet versus barbell portfolios.
Reference	Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 12. Applying Duration, Convexity, and DV01.

41. Question A junior risk analyst is modeling the volatility of a certain market variable. The analyst considers using either the EWMA or the GARCH (1,1) model. Which of the following statements is correct?

A The EWMA model is a special case of the GARCH (1,1) model with the additional assumption that the long-run volatility is zero.

B A variance estimated from the GARCH (1,1) model is a weighted average of the prior day's estimated variance and the prior day's squared return.

C The GARCH (1,1) model assigns a higher weight to the prior day's estimated variance than the EWMA model.

D A variance estimated from the EWMA model is a weighted average of the prior day's estimated variance and the prior day's squared return.

Correct Answer D

Explanation D is correct. The EWMA estimate of variance is a weighted average of the variance rate estimated for the prior day and the prior day's observed squared return.

A is incorrect. EWMA is a particular case of GARCH (1,1) with the weight assigned to the long-run average variance rate as zero and the sum of the weights of the other two parameters equal to 1.

B is incorrect because there is also weight assigned to the long-run average variance rate.

C is incorrect because such a comparison can only be done under specific parameter configurations.

Section Valuation and Risk Models

Learning Objective Compare and contrast different approaches for estimating conditional volatility.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 3. Measuring and Monitoring Volatility.

42. Question A risk analyst is studying the history of the subprime mortgage crisis that took place in the US between 2007 and 2009. The risk analyst finds that the delinquencies of subprime mortgages rose significantly after mid-2005. Which of the following was a contributing factor for the increase in delinquencies?

A Mortgages became increasingly over-collateralized in 2005.

B Interest rates decreased significantly throughout 2005.

C Many first-time home buyers paid zero down payment in 2005.

D Housing prices began to rise sharply at the end of 2005.

Correct Answer C

Explanation C is correct. One of the reasons for why delinquencies rose significantly after mid-2005 is that in 2005, 43% of first-time home buyers paid zero down payment, significantly reducing the collateral cushion in case housing prices declined.

A is incorrect. Mortgages becoming increasingly under-collateralized is another factor contributing to the crisis.

B is incorrect. Another reason contributing to the crisis that the interest rates started to increase in 2005. This forced payments on adjustable-rate mortgages higher after the initial “teaser” period.

D is incorrect. Housing prices began to fall sharply in 2006. An increase in housing prices would have been beneficial to subprime mortgage holders.

Section Foundations of Risk Management

Learning Objective Describe the build-up to the financial crisis and the factors that played an important role.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 10. Anatomy of the Great Financial Crisis of 2007–2009.

43. Question

A market risk analyst is projecting a range of returns on stock XYZ for the next month. Using the returns of the prior 12 months, the analyst estimates the mean monthly return of the stock to be -0.75% with a standard error of 2.70%.

One-tailed t-distribution table			
Degrees of freedom	**α**		
	0.100	**0.050**	**0.025**
8	1.397	1.860	2.306
9	1.383	1.833	2.262
10	1.372	1.812	2.228
11	1.363	1.796	2.201
12	1.356	1.782	2.179

Using the t-table above, which of the following is the 95% confidence interval for the mean return of stock XYZ?

A -6.69% and 5.19%

B -6.63% and 5.13%

C -5.60% and 4.10%

D -5.56% and 4.06%

Correct Answer A

Explanation A is correct. The confidence interval is equal to the mean monthly return plus or minus the t-statistic times the standard error. To get the proper t-statistic, the 0.025 column must be used since this is a two-tailed interval. Since the mean return is being estimated using the sample observations, the appropriate degrees of freedom to use is equal to the number of sample observations minus 1, which is 11. Therefore, the proper statistic to use from the t-distribution is 2.201. The 95% confidence interval is between -0.75% - 2.201*2.70% and -0.75% + 2.201*2.70%.

B is incorrect. This uses the value of the t-statistic of 2.179 from the table given above.

C is incorrect. This uses the value of the t-statistic of 1.796 from the table given above.

D is incorrect. This uses the value of the t-statistic of 1.782 from the table given above.

Section Quantitative Analysis

Learning Objective Construct and apply confidence intervals for one-sided and two-sided hypothesis tests, and interpret the results of hypothesis tests with a specific confidence level.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 6. Hypothesis Testing.

44. Question A financial analyst is concerned about the market risk of a stock. Based on the stock's return data of the most recent 12 months, it has been estimated that the historical volatility of the monthly returns is 4.5%. Which of the following is most likely correct?

A The implied volatility of the annual returns is 15.6%.

B The implied volatility of the annual returns is 54.0%.

C The volatility of the annual returns is 15.6%.

D The volatility of the annual returns is 54.0%.

Correct Answer C

Explanation C is correct. This is $\sqrt{12}*0.045=0.156$.

A and B are incorrect. The implied volatility depends on the option price and it does not depend on the historical volatilities.

D is incorrect. This incorrectly scales the volatility linearly with time instead of by the square root of time, giving $12*0.045=0.54$.

Section Quantitative Analysis

Learning Objective Define and distinguish between volatility, variance rate, and implied volatility.

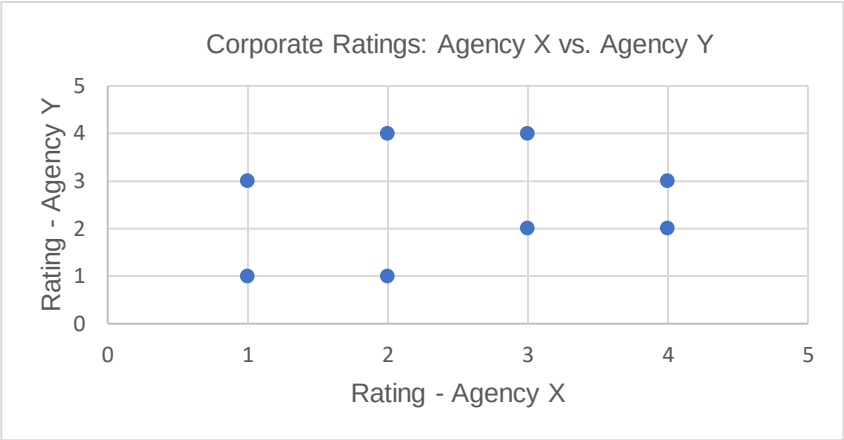
Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 12. Measuring Returns, Volatility, and Correlation.

45. Question

A credit risk manager is in charge of credit risk analysis of large corporates at Bank XYZ. The manager is in possession of credit ratings provided by two rating agencies, X and Y, for 30 companies the manager oversees. The ratings are classified into four categories:

Rating categories	Description
1	High investment grade
2	Mid investment grade
3	Low investment grade
4	Non-investment grade

The manager plots the rating categories from the two agencies as shown below:



Which of the following statistical measures could best help the manager approximate the link between rating categories from the two agencies?

A Spearman correlation

B Pearson correlation

C Structured correlation matrix

D Covariance

Correct Answer: A

Explanation: A is correct. The credit ratings in this question are ordinal data and have a nonlinear relationship as showed in the graph. Hence, the Spearman correlation is the best of the given measures to indicate if one variable is monotonically related to the other variable.

B, C, and D are incorrect. Pearson correlation, correlation matrix and covariance are used to measure the degree of the relationship between linearly related variables.

Section: Quantitative Analysis

Learning Objective	Explain the relationship between the covariance and correlation of two random variables and how these are related to the independence of the two variables. Define correlation and covariance and differentiate between correlation and dependence.
Reference	Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 4. Multivariate Random Variables. Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 12. Measuring Returns, Volatility, and Correlation.

46. Question An analyst is evaluating a dataset of annual returns for a financial asset. The analyst decides to use the Jarque-Bera test to determine if the returns of the asset are normally distributed. Which of the following is correct regarding the Jarque-Bera test?

A The Jarque-Bera test statistic follows a Student's t distribution.

B The Jarque-Bera test only takes into account the skewness and kurtosis of a distribution.

C The Jarque-Bera test requires that a Gaussian copula be applied to the returns data before conducting the test.

D The Jarque-Bera test statistic does not depend on the sample size of the returns dataset.

Correct Answer B

Explanation B is correct. The Jarque-Bera test statistic is used to formally test whether the sample skewness and kurtosis are compatible with an assumption that the returns are normally distributed.

A is incorrect. The Jarque-Bera test assumes a normal distribution.

C is incorrect. There is no need for a Gaussian copula to be applied prior to testing.

D is incorrect. The test statistic is also a function of the sample size.

Section Quantitative Analysis

Learning Objective Explain how the Jarque-Bera test is used to determine whether returns are normally distributed.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 12. Measuring Returns, Volatility, and Correlation.

47. Question An analyst is conducting a Monte Carlo simulation to estimate the expected value of a random variable. The analyst wants to reduce the standard error of the simulated expectation. Which of the following correctly describes a method for reducing the standard error?

A Increasing the expected value of the simulation

B Increasing the number of replications

C Increasing the variance of the distribution

D Increasing the confidence level of the simulation

Correct Answer B

Explanation B is correct. One way to increase the accuracy of estimation from Monte Carlo simulation is to increase the number of replications.

A is incorrect. Increasing the expected value does not affect the accuracy of the simulation.

C is incorrect. Increasing the variance does not improve accuracy of the simulation; the opposite effect occurs.

D is incorrect. Increasing the confidence level only provides a wider range of values but does not improve accuracy.

Section Quantitative Analysis

Learning Objective Describe ways to reduce Monte Carlo sampling error.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 13. Simulation and Bootstrapping.

48. Question

An investment advisor is analyzing the range of potential expected returns of a new fund designed to replicate the directional moves of the China Shanghai Composite Stock Market Index (SHANGHAI) but with twice the volatility of the index. SHANGHAI has an expected annual return of 7.6% and a volatility of 14.0%, and the risk-free rate is 3.0% per year. Assuming the correlation between the fund's returns and that of the index is 1.0, what is the expected return of the fund using the CAPM?

A 12.2%

B 19.0%

C 22.1%

D 24.6%

Correct Answer: A

Explanation: A is correct. If the CAPM holds, then $R_i = R_f + \beta_i * (R_m - R_f)$.

Beta (β_i), which determines how much the return of the fund fluctuates in relation to the index return is expressed as follows:

$$\beta_i = \frac{\mathrm{Cov}(\mathrm{R}_i, \mathrm{R}_m)}{\sigma_m^2} = \frac{\mathrm{Corr}(\mathrm{R}_i, \mathrm{R}_m) * \sigma_i \sigma_m}{\sigma_m^2} = \frac{\mathrm{Corr}(\mathrm{R}_i, \mathrm{R}_m) * \sigma_i}{\sigma_m}$$

where *i* and *m* denote the new fund and the index, respectively, and R_i = expected return on the fund, R_m = expected return on the index, R_f = risk-free rate, σ_i = volatility of the fund, σ_m = volatility of the index, $\mathrm{Cov}(R_i,R_m)$ = covariance between the fund and the index returns, and $\mathrm{Corr}(R_i,R_m)$ = correlation between the fund and the index returns.

If the new fund has twice the volatility of the index, then $\sigma_i = 2\sigma_i = 2\sigma_m$, and given that $\mathrm{Corr}(R_i,R_m) = 1.0$, the beta of the new fund then becomes:

$$\beta_i = \frac{\mathrm{Corr}(\mathrm{R}_i, \mathrm{R}_m) * 2\sigma_m}{\sigma_m} = 1.0 * 2.0 = 2.0$$

Therefore, using CAPM, $R_i = R_f + \beta_i * (R_m - R_f) = 0.03 + 2.0*(0.076 - 0.03) = 0.1220 = 12.2\%$.

Section: Foundations of Risk Management

Learning Objective: Apply the CAPM in calculating the expected return on an asset.

Reference: Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 5. Modern Portfolio Theory and the Capital Asset Pricing Model.

49. Question The board of directors of a growing asset management company is conducting a review of the firm's approach to risk management. The board concludes that the firm should establish an ERM framework. Which of the following represents a key benefit that the firm will likely attain after establishing an ERM framework?

A Allowing the company to determine and make use of a higher risk appetite

B Finding the optimal reporting methodology for each risk function

C Improving the top-down communication and coordination in the company

D Taking advantage of the new opportunities that create value on a standalone basis

Correct Answer C

Explanation C is correct. Implementation of ERM requires integration. Appointing a CRO and establishing a centralized, integrated risk management team can better address the interdependencies among individual risks faced by the company and thus increase efficiency.

A is incorrect because ERM does not necessarily allow the company to determine and make use of a higher risk appetite.

B is incorrect because ERM suggests the opposite of a fragmented approach in risk management.

D is incorrect because ERM improves business performance by taking a portfolio view of all risks rather than on a standalone basis.

Section Foundations of Risk Management

Learning Objective Describe the motivations for a firm to adopt an ERM initiative.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 8. Enterprise Risk Management and Future Trends.

50. Question

A risk analyst is estimating the variance of returns on a stock index for the next trading day. The analyst uses the following GARCH (1,1) model:

$$\sigma_n^2 = \alpha r_{n-1}^2 + \beta \sigma_{n-1}^2 + \gamma V_L,$$

where σ_n^2, r_{n-1}, and σ_{n-1} represent the index variance on day n, return on day n-1, and volatility on day n-1, respectively. If the expected value of the return is constant over time, which combination of values for α and β would result in a stable GARCH (1,1) process?

A α = 0.073637 and β = 0.927363

B α = 0.075637 and β = 0.923363

C α = 0.084637 and β = 0.916363

D α = 0.086637 and β = 0.914363

Correct Answer: B

Explanation: B is correct. For a GARCH (1,1) process to be stable, the parameters α, β, and γ must be positive and sum to 1. Therefore, the sum of α and β needs to be less than 1.

A, C, and D are incorrect. In each of these cases, the sum of α and β is greater than 1.

Section: Valuation and Risk Models

Learning Objective: Apply the GARCH (1,1) model to estimate volatility.

Reference: Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 3. Measuring and Monitoring Volatility.

51. Question

A portfolio manager is analyzing the impact of yield changes on two portfolios: portfolio ASD and portfolio BTE. Portfolio ASD has two zero-coupon bonds and portfolio BTE has only one zero-coupon bond. Additional information on the portfolio is provided in the table below:

	Portfolio components	Yield per year	Maturity (years)	Face value
Portfolio ASD	Bond 1	10%	3	USD 1,000,000
	Bond 2	10%	9	USD 1,000,000
Portfolio BTE	Bond 3	8%	6	USD 1,000,000

To assess the potential effect of a parallel shift in the yield curve on portfolio values, the manager runs a scenario in which yields increase by 200 bps across all points of the yield curve. In addition, the manager estimates a convexity of 34.51 for portfolio ASD and 36.00 for portfolio BTE. Assuming continuous compounding, which of the following are the best estimates of the decrease in the values of the two portfolios due to the combined effects of duration and convexity?

A Portfolio ASD decreases by USD 102,000; portfolio BTE decreases by USD 65,000

B Portfolio ASD decreases by USD 110,000; portfolio BTE decreases by USD 70,000

C Portfolio ASD decreases by USD 118,000; portfolio BTE decreases by USD 74,000

D Portfolio ASD decreases by USD 127,000; portfolio BTE decreases by USD 79,000

Correct Answer: B

Explanation: B is correct.

Step 1 - Calculate the values of the two portfolios before increases in yield:

Portfolio ASD
P_A = Value before yield increase: $1{,}000{,}000*e^{(-0.1*3)} + 1{,}000{,}000*e^{(-0.1*9)}$
= USD 740,818.22 + USD 406,569.66 = USD 1,147,387.88
Portfolio BTE
P_B = Value before yield increase: $1{,}000{,}000*e^{(-0.08*6)}$ = 618,783.39

Step 2 - Calculate the duration of the two portfolios before increases in yield:

Portfolio ASD
D_A = weighted-average durations of the two zero-coupon bonds
= $D_A*W_A + D_B*W_B$ = 3*(740,818.22/1,147,387.88) + 9*(406,569.66/1,147,387.88) = 5.13
Portfolio BTE
D_B = duration of portfolio BTE = 6.00 (duration is approximately same as maturity for a zero-coupon bond).

Step 3 – Note the convexities given for the two portfolios (no need to calculate):
C_A = 34.51; and C_B = 36.00

Step 4 - Estimate the changes in portfolio values due to the yield change (Δy) and the effects of duration and convexity:
Change in bond value = $\Delta P = -P*D*\Delta y + \frac{1}{2}*P*C*(\Delta y)^2$. Thus,

Portfolio ASD
$\Delta P_A = -P_A*D_A*\Delta y + \frac{1}{2}*P_A*C_A*(\Delta y)^2$
$= -1{,}147{,}387.88*5.13*0.02 + 0.5*1{,}147{,}387.88*34.51*(0.02)^2$
$= -117{,}722.00 + 7{,}919.27 =$ USD -109,802.73
Portfolio BTE
$\Delta P_B = -P_B*D_B*\Delta y + \frac{1}{2}*P_B*C_B*(\Delta y)^2$
$= -618{,}783.39*6.00*0.02 + 0.5*618{,}783.39*36*(0.02)^2$
$= -74{,}254.00 + 4{,}455.24 =$ USD -69,798.76

A is incorrect. The change in value for both portfolios are wrongly computed as the parameter 0.5 is left out in the convexity formula.

C is incorrect. The changes in value for both portfolios do not consider the effect of convexity.

D is incorrect. Changes in value for both portfolios are wrongly computed by inserting a negative sign (rather than a positive) in the convexity part of the formula.

Section	Financial Markets and Products
Learning Objective	Calculate the change in a bond's price given its duration, its convexity, and a change in interest rates.
Reference	Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 16. Properties of Interest Rates.

52. Question

The treasurer of a London-based insurance company expects that 3 years from today the company will receive GBP 800,000. The treasurer plans to invest the funds for 1 year after that and decides to lock in a rate of return on the funds at today's forward rate for the period. The current 3-year and 4-year spot rates are 1.5% and 2% respectively, and the company can borrow and lend at these rates. Assuming continuous compounding, how much interest income will the company earn in the 1-year period beginning 3 years from today, and what transactions should the treasurer enter into today in order to lock in this return?

A Borrow at the 3-year spot rate and lend at the 4-year spot rate to earn a return of GBP 28,000.

B Lend at the 3-year spot rate and borrow at the 4-year spot rate to earn a return of GBP 28,000.

C Borrow at the 3-year spot rate and lend at the 4-year spot rate to earn a return of GBP 28,119.

D Lend at the 3-year spot rate and borrow at the 4-year spot rate to earn a return of GBP 28,119.

Correct Answer: A

Explanation: A is correct. The forward rate for the period from the end of year 3 to the end of year 4 is:

$$F = \frac{R_2 T_2 - R_1 T_1}{T_2 - T_1}$$

$$= \frac{0.02 * 4 - 0.015 * 3}{4 - 3} = 0.035 \; or \; 3.5\%$$

(Alternatively, $F = ln\big(exp(0.02 * 4)/exp(0.015 * 3)\big)$.)

3.5% interest on the GBP 800,000 invested equals GBP 28,000 in 1 year. To earn this interest, the company would need to borrow GBP 800,000 today at 1.5% for 3 years and invest the proceeds at 2% for 4 years.

B is incorrect. The company needs to borrow at the 3-year spot rate and lend at the 4-year spot rate.

C and D are incorrect. GBP 28,119 is the interest income if annual compounding is used instead of continuous compounding.

Section: Valuation and Risk Models

Learning Objective: Interpret the forward rate and compute forward rates given spot rates.

Reference: Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 10. Interest Rates.

53. Question A derivatives desk trades a large volume of US Treasury bond futures contracts. A junior analyst at the desk is asked to monitor the bond markets and the process of delivering a bond against an expiring futures contract. The analyst studies how changes in market conditions determine which bonds are more likely to be the cheapest-to-deliver and how the process of delivery impacts the futures price. Which of the following observations will the analyst find to be correct?

A As bond yields increase, short maturity bonds with low coupons will tend to be the cheapest-to-deliver.

B The embedded options associated with delivery against a US Treasury futures contract tend to increase the value of the contract.

C The “wild card play” benefits owners of long positions in expiring futures contracts by allowing them to determine when counterparties holding short positions will deliver.

D A downward-sloping yield curve makes it more likely that short-maturity bonds will be cheapest-to-deliver.

Correct Answer D

Explanation D is correct. A downward-sloping yield curve tends to favor short-maturity bonds as these are more likely to be the cheapest to deliver.

A is incorrect. An increase in yields tends to favor long-maturity low coupon bonds as the cheapest to deliver.

B is incorrect. There are two embedded options associated with the delivery of a futures contract – the ability to use the cheapest to deliver bond and the “wild card play” where a short counterparty can choose when to deliver the bond. Both of these options benefit the short counterparty and therefore lower the futures price.

C is incorrect. The short counterparty has the right to determine when during the month they will deliver the bond as part of the wild card play. They can also send a notification to deliver after the 2pm closing time so can also exploit a time difference between the settlement of the futures at 2pm and the closing of the bond market later to try and buy the bond cheaper and deliver at the futures price.

Section Financial Markets and Products

Learning Objective Describe the impact of the level and shape of the yield curve on the cheapest-to-deliver Treasury bond decision.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 19. Interest Rate Futures.

54. Question The CRO of a multinational bank has assigned a team of risk analysts to design scenarios for an upcoming stress test. The analysts discuss the common approaches used by financial institutions to develop scenarios. Which of the following statements regarding stress testing scenarios is correct?

A Scenarios that have not occurred in the past, but are created by assuming changes of a certain amount in key variables, are typically not used in stress testing.

B Extremely adverse scenarios can be developed from moderately adverse periods in the past by multiplying movements in all risk factors by a certain amount, although this approach may fail to account for changes in correlations between these factors.

C Historical scenarios of one day or one week in length are not useful in stress testing because such periods are not considered long enough to pose a meaningful threat to a bank's financial stability.

D Senior management should leave the development of scenarios to risk managers and analysts who have the deepest knowledge of the risk exposures of the various business lines.

Correct Answer B

Explanation B is correct. Sometimes, a moderately adverse scenario from the past is made more extreme by multiplying the movements in all risk factors by a certain amount. However, this approach assumes there is a simple linear relationship between the movements in risk factors. This is not necessarily the case, however, because correlations between risk factors tend to increase as economic conditions become more stressed.

A is incorrect. One approach to scenario building is to assume that a large change takes place in one or more key variables. In general, as tress tests are designed to be forward-looking, it is useful to consider scenarios that have not necessarily occurred in the past.

C is incorrect. Sometimes, historical scenarios are based on what happened to all market risk factors over one day or one week (e.g. October 19, 1987 or September 11, 2001). These short-horizon stress tests can be supplements to stressed VaR and stressed ES calculations.

D is incorrect. Senior management should challenge key assumptions in stress testing scenarios, or suggest new scenarios for consideration. Among other reasons, involving senior management in building scenarios makes it more likely that the stress testing will be taken seriously and used for decision-making.

Section Valuation and Risk Models

Learning Objective Explain key considerations and challenges related to stress testing, including choice of scenarios, regulatory specifications, model building, and reverse stress testing.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 8. Stress Testing.

55. Question A group of credit risk analysts at a large bank is discussing regulatory capital and economic capital in relation to different types of risk exposures. The analysts evaluate differences in the approach to calculating these measures and in their use. In comparing the two types of capital, which of the following statements would the analysts be correct to make?

A Firm-wide economic capital is typically equal to the sum of the separately calculated capital amounts for credit risk, market risk, and operational risk.

B An increase in the probability of default of a loan portfolio increases economic capital, while leaving regulatory capital unchanged.

C Economic capital is the amount of capital a bank needs to cover its expected losses, while regulatory capital is the amount of capital a bank needs to cover its unexpected losses.

D Firm-wide economic capital typically considers correlations between credit risk, market risk, and operational risk.

Correct Answer D

Explanation D is correct. Economic capital is distinguished from regulatory capital in that it considers correlations between credit, market, and operational risks. Regulatory capital requirements only require that the separate risks be added to come up with total capital requirements.

A is incorrect. As noted in A above, regulatory capital adds the separate capital calculations for credit, market, and operational risk to find total capital requirements.

B is incorrect. Both economic and regulatory capital would go up in that case.

C is incorrect. Both economic capital and regulatory capital act as a cushion that covers unexpected losses. Economic capital is the bank's own estimate of the capital it should hold, while regulatory capital is the amount of capital regulators require it to hold.

Section Valuation and Risk Models

Learning Objective Explain the distinctions between economic capital and regulatory capital and describe how economic capital is derived.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 6. Measuring Credit Risk.

56. Question

A large international bank has branches in four different countries. The CFO of the bank is considering issuing a bond in one of those countries, and believes that the country with the lowest real interest rate would present the best terms to the bank. Relevant information is in the table below:

Country	Nominal interest rate	Inflation
A	3.9%	1.9%
B	4.1%	2.0%
C	4.2%	2.3%
D	4.6%	2.5%

Assuming that all other parameters are equal, in which of the four countries should the bank issue the bond?

A Country A

B Country B

C Country C

D Country D

Correct Answer C

Explanation C is correct. Using the formula $R_{real} = (1+R_{nom})/(1+R_{infl})-1$ generates the following results:

Country	Nominal interest rate	Inflation	Real interest rate
A	3.9%	1.9%	2.0%
B	4.1%	2.0%	2.1%
C	4.2%	2.3%	1.9%
D	4.6%	2.5%	2.0%

Therefore, C has the lowest real interest rate.

A, B, and D are incorrect per the explanation for C above.

Section Financial Markets and Products

Learning Objective Describe the relationship between nominal and real interest rates.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 9. Foreign Exchange Markets.

57. Question A junior credit risk analyst at a US firm is preparing a research report on the attributes and performance of corporate bonds. The analyst assesses corporate bond default rates, credit spread risk, recovery rates, and their impact on portfolio returns for a typical class of investment grade bonds. Which of the following statements would the analyst be correct to include in the report?

A The distribution of recovery rates of corporate issues is best described as a binomial distribution.

B The size of a bond issuance is not empirically related to its recovery rates.

C Measured over the same time period, US Treasury securities always outperform a portfolio of corporate bonds that experiences defaults.

D Spread duration is best measured by the change in the corporate bond yield for a given 100 bp change in the Treasury rate.

Correct Answer B

Explanation B is correct. Recovery rates are not related to bond issuance size.

A is incorrect. The empirical distribution of recovery rates is bimodal, and not binomial, normal or lognormal.

C is incorrect. It is possible for a corporate bond that experiences defaults to outperform US Treasury securities.

D is incorrect. While measuring a corporate's credit-spread risk, the Treasury rate (risk-free rate) is held unchanged. One of the measures of credit-spread risk is "spread duration," which is the approximate percentage change in a bond's price for a 100 bp change in the credit-spread assuming that the Treasury rate is unchanged.

Section Financial Markets and Products

Learning Objective Differentiate between credit default risk and credit spread risk.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 17. Corporate Bonds.

58. Question An operational risk analyst is attempting to estimate a bank's loss severity distribution. However, there is a limited amount of historical data on operational risk losses. Which of the following is the best way to address this issue?

A Generate additional data using Monte Carlo simulation and merge it with the bank's internal historical data.

B Estimate the parameters of a Poisson distribution to model the loss severity of operational losses.

C Estimate relevant probabilities using loss information that is published by credit rating agencies.

D Merge external data from other banks with the bank's internal data after making appropriate scale adjustments.

Correct Answer D

Explanation D is correct. Using external data obtained from other banks is one good way to increase the data set of historical operational losses. Data from other banks need to be adjusted for size, based on the relative size of the banks' revenues, before being merged with the'bank's internal data.

A is incorrect. Using distributions does not help resolve the issue of incomplete underlying data.

B is incorrect. Lognormal distributions, not Poisson distributions, are generally used for modeling loss severity. Also, using distributions does not help resolve the issue of incomplete underlying data.

C is incorrect. Credit losses are generally much better documented than operational losses inside the bank. External credit ratings publish probability of default and expected loss data that provides additional data. Operational loss is generally documented much less rigorously, and regulatory initiatives are now pushing banks to document operational loss data.

Section Valuation and Risk Models

Learning Objective Describe the common data issues that can introduce inaccuracies and biases in the estimation of loss frequency and severity distributions.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 7. Operational Risk.

59. Question A market risk team at a hedge fund is developing stress test scenarios to assess the impact of changes in different market variables on the fund's portfolio of agency-backed MBS. The team wants to identify potential factors that would likely cause the rate of prepayments on the MBS portfolio to increase. Holding all else constant, which of the following would most likely result in increased prepayments in the portfolio?

A A decrease in defaults experienced in the mortgage pool

B A decrease in the average loan-to-value ratio of the mortgage pool

C An increase in market interest rates

D An increase in the supply of newly built housing

Correct Answer B

Explanation B is correct. A decrease in the average loan-to-value ratio is likely to cause curtailments, which are partial prepayments, therefore increasing prepayments.

A is incorrect. A decrease in defaults usually decreases prepayments.

C is incorrect. An increase in market interest rates usually decreases prepayments.

D is incorrect. An increase in the supply of new houses decreases the value of existing houses, thus slowing down refinancing activity for drawing on home equity.

Section Financial Markets and Products

Learning Objective Describe the mortgage prepayment option and factors that affect it, explain prepayment modeling and its four components: refinancing, turnover, defaults, and curtailments.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 18. Mortgages and Mortgage-Backed Securities.

60. Question A risk analyst at a financial institution is preparing a report on capital requirements for the senior management team to be used in risk appetite discussions. The analyst compares regulatory capital and economic capital requirements in the report. Which of the following statements is correct for the analyst to include in the report?

A The regulatory capital for credit risk is designed to be sufficient to cover a loss that is expected to be exceeded only once every ten years.

B Regulatory capital is sometimes referred to as going concern capital because it absorbs losses incurred while the bank is still in business.

C The most important capital for a bank is regulatory capital, which equals the bank's estimate of its expected losses.

D Economic capital is an internal risk measure that reflects the amount of capital needed to ensure a company remains solvent with a high level of confidence, given its risk profile.

Correct Answer D

Explanation D is correct. Economic capital is a bank's own estimate of the capital it requires. In both cases, capital can be thought of as funds that are available to absorb unexpected losses. A common objective in calculating economic capital is to maintain a high credit rating. Economic capital is allocated to a bank's business units so that they can be compared using a return on allocated economic capital metric.

A is incorrect. The regulatory capital for credit risk is designed to be sufficient to cover a loss that is expected to be exceeded only once every thousand years.

B is incorrect. Equity capital is sometimes referred to as going concern capital because it absorbs losses while the bank is a going concern (i.e., it remains in business).

C is incorrect. The most important capital is equity capital.

Section Financial Markets and Products

Learning Objective Distinguish between economic capital and regulatory capital.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 1. Banks.

61. Question An analyst at an investment firm is researching the fee structures at several hedge funds. The analyst notes that, in the past, incentive fees strongly favored hedge fund managers to the disadvantage of investors in the hedge funds, causing investors to be reluctant to invest in them. Many hedge funds have recently adjusted the terms they offer to attract new investors. Which of the following correctly describes one of these adjustments to the fee structure?

A A high-water mark clause states that incentive fees will only be paid when returns are above a certain percentage return each year.

B A hurdle rate states that incentive fees will only be paid when cumulative investor profits are positive and are above a specified amount.

C A clawback clause provides a mechanism for investors to reclaim incentive fees that have already been paid.

D A proportional adjustment clause provides a mechanism to raise the hurdle rate as the hedge fund generates more profits.

Correct Answer C

Explanation C is correct. A clawback clause is used to create a mechanism whereby investors can reclaim incentive fees that have already been paid if the hedge fund suffers losses in subsequent years.

A is incorrect. This is the description of a hurdle rate.

B is incorrect. A high-water mark clause states that incentive fees will only be paid when cumulative investor profits are positive.

D is incorrect. A proportional adjustment clause states that the high-water mark only applies to funds that are not withdrawn.

Section Financial Markets and Products

Learning Objective Calculate the return on a hedge fund investment and explain the incentive fee structure of a hedge fund, including the terms hurdle rate, high-water mark, and clawback.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 3. Fund Management.

62. Question

Bank QRS is considering extending loans to corporations based in a frontier market country. A credit risk analyst at the bank has conducted research on the country to determine factors that may affect its country risk and has compiled the following findings:

- Item 1: The country's economy is dominated by oil production, and it holds significant oil reserves.
- Item 2: The country has recently enacted laws making it easier for investors to file lawsuits against firms and their management teams than before.
- Item 3: The country has recently reformed its legal system to make it more independent of other branches of government.
- Item 4: The country's sovereign credit spreads have declined over the past year.

Which of these items is most likely to have a negative impact on the country's risk score?

A Item 1

B Item 2

C Item 3

D Item 4

Correct Answer A

Explanation A is correct. A higher dependence on a single commodity makes a country's overall economy more vulnerable to changes in demand or prices of that commodity.

B is incorrect. A legal system that provides for lawsuits against firms and their management allows investors recourse in the event of insider trading, fraud, or other actions that hurt investors, thereby lowering country risk.

C is incorrect. Because business activities inevitably generate disputes, firms do not want to invest in a country where the legal system is biased or subject to government interference.

D is incorrect. Declining credit spreads signal credit quality improvement.

Section Valuation and Risk Models

Learning Objective Explain how a country's position in the economic growth life cycle, political risk, legal risk, and economic structure affect its risk exposure.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 5. Country Risk: Determinants, Measures and Implications.

63. Question A newly hired risk analyst at a bank is studying historical cases of financial disasters and their causes to learn how financial risks can arise in practice. The analyst focuses on the example of Barings Bank. Which of the following statements is correct for the analyst to make regarding the collapse of Barings Bank?

A A rogue trader at Barings Bank convinced the bank's risk controllers that large unauthorized trades were necessary to hedge the bank's portfolios.

B Management of Barings Bank failed to investigate the high level of reported profits that were associated with supposedly low-risk trading strategies.

C Traders at Barings Bank traded primarily in OTC foreign currency swaps that allowed the bank to delay cash payments on losing trades.

D Management of Barings Bank was not aware of the losses incurred by the bank until clients reported unusual losses on trades that were booked to their accounts.

Correct Answer B

Explanation B is correct. Nick Leeson, the rogue trader at Barings, was supposed to be running a low-risk, limited return arbitrage business out of his Singapore office, but in actuality he was investing in large speculative positions in Japanese stocks and interest rate futures and options. When Leeson fraudulently declared very substantial reported profits on his positions, management did not investigate the stream of large profits even though it was supposed to be associated with a low-risk strategy.

A is incorrect. The risk controllers' inquiries to investigate the large stream of profits reported by Nick Leeson were dismissed by Leeson's superiors, citing the bank's unique ability to exploit an arbitrage situation. The superiors did not cite hedging as a reason for wanting to maintain the positions.

C and D are incorrect. These scenarios did not occur at Barings Bank.

Section Foundations of Risk Management

Learning Objective Analyze the key factors that led to and derive the lessons learned from case studies involving the following risk factors:

- Rogue trading and misleading reporting, including the Barings case.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 9. Learning from Financial Disasters.

64. Question

A market risk manager is analyzing the performance of VTFX, a large cap growth mutual fund that uses the performance of the MSCI World Large Cap Growth Index (MWG) as a benchmark. The manager runs a regression using monthly returns of VTFX as the dependent variable and monthly returns of the MWG as the explanatory variable. The constructed regression model and the results of the regression are as follows:

$$VTFX_t = \beta_0 + \beta_1(MWG_t) + \varepsilon_t$$

Coefficient	Coefficient estimate	Standard error
β_0	-0.0178	0.0139
β_1	1.2631	0.0428
Source of variation	**Sum of squares**	
Explained	0.0527	
Residual	0.0091	

At a 95% confidence level, which of the following conclusions would be correct for the manager to make?

A Both the slope coefficient and the intercept coefficient are not statistically significant.

B Both the slope coefficient and the intercept coefficient are statistically significant.

C The intercept coefficient is statistically significant, but the slope coefficient is not.

D The slope coefficient is statistically significant, but the intercept coefficient is not.

Correct Answer D

Explanation D is correct. In implementing a t-test with a 5% level of significance, the test statistic value is compared to the critical values from a standard normal distribution.

The test statistic for the slope coefficient is given by $T = \frac{\beta_1 - \beta_0}{s.e.(\beta_1)}$ = (1.2631-0)/0.0428 = 29.51.

Similarly, the test statistic for the intercept coefficient is calculated as (-0.0178-0)/0.0139 = -1.28.

Since the critical value from a standard normal distribution is 1.96, only the slope coefficient can be concluded as being statistically significant. The intercept term is not statistically different from zero at the 5% level of significance.

A, B, and C are incorrect.

Section Quantitative Analysis

Learning Objective Construct, apply, and interpret hypothesis tests and confidence intervals for a single regression coefficient in a regression.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 7. Linear Regression.

65. Question

A certified FRM working as a risk manager at a bank is asked by the CRO to present a report to the public on the bank's compliance with industry best practices in risk management. The risk manager includes information about risk adjusted returns of specific clients in the report to support the conclusion that the bank's risk management practices are strong. Which of the following statements is most appropriate regarding the adherence of the manager's behavior to the standards of the GARP Code of Conduct in this situation?

A The manager violates the GARP Code of Conduct because the manager discloses some of the bank's confidential information.

B The manager violates the GARP Code of Conduct because the manager overstates the strength of the bank's risk management practices in the report.

C The manager violates the GARP Code of Conduct because the manager does not distinguish between facts and opinions.

D The manager does not violate the GARP Code of Conduct.

Correct Answer: A

Explanation: A is correct. The manager reveals some confidential information, the realized loss recovery rates, in the report to the public. GARP Members will take all reasonable precautionary measures to prevent intentional and unintentional disclosure of confidential information.

B is incorrect. The manager uses facts to support the conclusion and does not overstate the strength of the bank's risk management practices.

C is incorrect. This scenario does not involve distinguishing facts and opinions.

D is incorrect. The manager violates the GARP Code of Conduct as the manager discloses the confidential information of the bank.

Section: Foundations of Risk Management

Learning Objective: Describe the responsibility of each GARP Member with respect to professional integrity, ethical conduct, conflicts of interest, confidentiality of information, and adherence to generally accepted practices in risk management.

Reference: Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 11. GARP Code of Conduct.

66. Question A quantitative analyst is building a model whose output depends on the value of a financial variable, X. The analyst assumes X is a random variable that follows a normal distribution with a mean of 40 and a standard deviation of 14. What is the probability that X lies outside the range between 12 and 61?

A 4.56%

B 6.18%

C 8.96%

D 18.15%

Correct Answer C

Explanation C is correct. First, we must find the standardized (z) values for 12 and 61.

$$z = \frac{X - \mu}{\sigma}$$

$$\frac{12 - 40}{14} = -2$$

$$\frac{61 - 40}{14} = 1.5$$

Next, using a Z table we find the probability that z is less than -2:

$$P(z < -2) = 0.0228$$

And we find the probability that z is greater than 1.5:

$$P(z > 1.5) = 0.0668$$

Finally we add these values to find the probability that z is less than -2 or greater than 1.5:

$$P(z < -2) \text{ or } P(z > 1.5) = 0.0228 + 0.0668 = 0.0896.$$

Section Quantitative Analysis

Learning Objective Distinguish the key properties and identify the common occurrences of the following distributions: uniform distribution, Bernoulli distribution, binomial distribution, Poisson distribution, normal distribution, lognormal distribution, Chi-squared distribution, Student's t and F-distributions.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 3. Common Univariate Random Variables.

67. Question An investment performance analyst is calculating some performance measures on portfolio LCM. Portfolio LCM has an expected return of 9%, volatility of 21%, and a beta of 0.3. If the risk-free rate is 3%, what is the Treynor measure of portfolio LCM?

A 0.08

B 0.15

C 0.20

D 0.40

Correct Answer C

Explanation C is correct. The Treynor measure can be calculated using the following equation:

$$T_p = \frac{E(R_p) - R_F}{\beta_p}$$

In this example, Tp = (9% - 3%)/0.3 = 0.20

Section Foundations of Risk Management

Learning Objective Calculate, compare, and interpret the following performance measures: the Sharpe performance index, the Treynor performance index, the Jensen performance index, the tracking error, information ratio, and Sortino ratio.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 5. Modern Portfolio Theory and the Capital Asset Pricing Model.

68. Question A risk consultant is advising a pension fund to revise its asset allocation approach to be more consistent with the theory of CAPM. The consultant prepares a list of the assumptions of CAPM to support the advice. Which of the following is an assumption of CAPM?

A There are transaction costs associated with buying and selling assets.

B An individual investor can affect the price of a stock by buying or selling that stock.

C Investors make their investment decisions by taking into account their personal income taxes.

D Investors have the same expectations regarding the expected returns and the variance of returns of all assets.

Correct Answer D

Explanation D is correct. CAPM assumes investors have identical expectations with respect to expected returns, the variance of returns, and the correlation matrix representing the correlation structure between all pairs of stocks. The other choices are not assumptions of the CAPM.

A is incorrect. CAPM assumes no transaction costs, taxes, or other frictions.

B is incorrect. CAPM assumes any individual investor's allocation decision cannot change the market prices.

C is incorrect. As said above, CAPM assumes no transaction costs, taxes, or other frictions.

Section Foundations of Risk Management

Learning Objective Describe the assumptions underlying the CAPM.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 5. Modern Portfolio Theory and the Capital Asset Pricing Model.

69. Question

The recent performance of Prudent Fund, a fund with USD 50 million of assets under management, has been weak and the institutional sales group is recommending that it be merged with Aggressive Fund, a USD 200 million fund. The returns on Prudent Fund are normally distributed with a mean of 3% and a standard deviation of 7%, and the returns on Aggressive Fund are normally distributed with a mean of 7% and a standard deviation of 15%. Assuming the returns on the two funds are independent, what is the probability that the returns on the combined fund will exceed 26%?

A 1.0%

B 2.5%

C 5.0%

D 10.0%

Correct Answer C

Explanation C is correct. Since these are independent normally distributed random variables, the combined expected mean return is:

$$\mu = 0.2 * 3\% + 0.8 * 7\% = 6.2\%$$

Combined volatility is:

$$\sigma = \sqrt{0.2^2 0.07^2 + 0.8^2 0.15^2} = 0.121 = 12.1\%$$

The appropriate Z-statistic is:

$$Z = \frac{26\% - 6.2\%}{12.1\%} = 1.64$$

Therefore, $P(Z > 1.64) = 1 - 0.95 = 0.05 = 5.0\%$

Section Quantitative Analysis

Learning Objective Calculate the probability of an event for a discrete probability function.

Compute the variance of a weighted sum of two random variables.

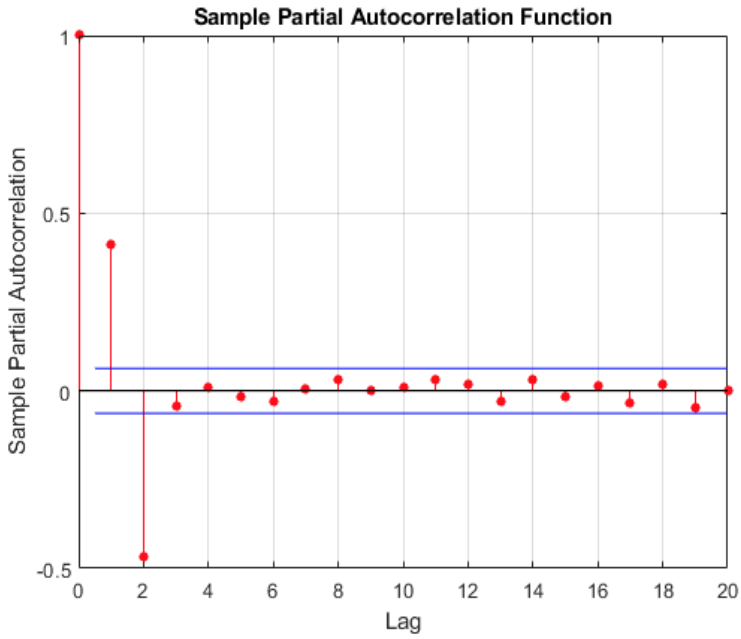
Explain how the iid property is helpful in computing the mean and variance of a sum of iid random variables.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 1. Fundamentals of Probability.

Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 4. Multivariate Random Variables.

70. Question

A market risk manager would like to analyze and forecast a security performance and has obtained the historical time series for that security. The manager consults a colleague from the quantitative analytic team who provides the following Partial Autocorrelation Function (PACF) plot:



Based on the plot above, which of the following is the best regression approach for the security?

A AR(1)

B MA(1)

C AR(2)

D MA(2)

Correct Answer C

Explanation C is correct. The PACF cuts off after the second lag. This behavior indicates an AR(2) process.

Section Quantitative Analysis

Learning Objective Define and describe the properties of autoregressive (AR) processes.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 10. Stationary Time Series.

71. Question

A risk manager at a bank is measuring the sensitivity of a bond portfolio to non-parallel shifts in spot rates. The portfolio currently holds a 4-year zero coupon bond and a 7-year zero coupon bond with the following sensitivities to these respective spot rates:

Spot rate	Change in portfolio value for 1-bp increase in spot rate (AUD)
4-year	-189.27
7-year	-302.45

To model the non-parallel movement of the spot rate curve, the manager treats the 2-year, 5-year, and 10-year spot rates as key rates. Given this information, what is the portfolio's key rate 01 (KR01) for a 1-bp increase in the 5-year rate?

A AUD 184.06

B AUD 226.99

C AUD 307.66

D AUD 491.72

Correct Answer C

Explanation C is correct. For a key rate (or partial) 01, the magnitude of a shift in a key rate declines linearly to zero at the next key rate above and/or below. Therefore, if the 5-year spot rate increases by 1 bp, the 4-year and 7-year spot rates change as follows:

4-year spot rate:

$$1 * \frac{4-2}{5-2} = 0.6667$$

7-year spot rate:

$$1 * \frac{10-7}{10-5} = 0.6$$

The change in the value of the portfolio for a 1 bp change in the 5-year spot rate is therefore:

$$0.6667 * -189.27 + 0.6 * -302.45 = 307.6563$$

A is incorrect. This incorrectly calculates the changes in the 4-year and 7-year rates as 0.3333 and 0.4 respectively.

B is incorrect. This incorrectly calculates the change in the 7-year rate as 0.3333.

D is incorrect. This incorrectly calculates the forward bucket 01 for the portfolio, assuming the 4-year and 7-year rates change by 1.

Section Valuation and Risk Models

Learning Objective	Define, calculate, and interpret key rate 01 and key rate duration.
Reference	Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 13. Modeling Non-Parallel Term Structure Shifts and Hedging.

72. Question

A fixed-income analyst is decomposing the profit and loss (P&L) of a bond over the past 6 months. The bond has a 2% coupon rate, paid semi-annually, and had exactly 2 years remaining until maturity at the start of the 6-month period. Relevant information about the bond and market rates (semi-annually compounded) is shown below:

	Beginning	Ending
Bond price (SGD)	100.35	101.24
Bond spread (bps)	30	20

Forward rates (periods in years)	Beginning	Ending
0 – 0.5	0.8%	0.7%
0.5 – 1	1.4%	1.0%
1 – 1.5	1.8%	1.2%
1.5 – 2	2.1%	2.0%

The analyst has calculated the bond's carry roll-down, and under the forward rate assumption made for the purpose of that calculation, the ending value of the bond is SGD 100.55. Given this information, what is the component of the bond's P&L attributable to the change in rates over the 6-month period?

A SGD 0.54

B SGD 0.69

C SGD 0.74

D SGD 0.99

Correct Answer A

Explanation A is correct. Calculating the impact of the change in rates is the second step in decomposing the P&L of a bond, after calculating the carry roll-down. The impact of a rate change is calculated as the value of the bond at the end of the period using the ending forward rate curve (and the bond's beginning-of-period spread), minus the end-of-period value of the bond calculated using the forward rates assumed for the purpose of determining carry roll-down (which represent some sense of "no change" in the interest rate environment). The value of the bond under the ending forward rate curve is:

$$\frac{1}{1+\frac{0.007}{2}+\frac{0.003}{2}}+\frac{1}{\left(1+\frac{0.007}{2}+\frac{0.003}{2}\right)*\left(1+\frac{0.01}{2}+\frac{0.003}{2}\right)}+\frac{101}{\left(1+\frac{0.007}{2}+\frac{0.003}{2}\right)*\left(1+\frac{0.01}{2}+\frac{0.003}{2}\right)*\left(1+\frac{0.012}{2}+\frac{0.003}{2}\right)}$$

$$=101.09$$

Therefore, the impact of the rate change is:

SGD 101.09 - SGD 100.55 = SGD = 0.54

B is incorrect. This uses the end-of-period spread of 20 bps in the above calculation rather than the beginning-of-period spread of 30 bps.

C is incorrect. This subtracts the bond's initial price, rather than the value from the carry roll-down calculation, from the value produced in the change in rates calculation: 101.09 – 100.35 = 0.74.

D is incorrect. This omits the spread from the above calculation of the impact of the change in rates.

Section	Valuation and Risk Models
Learning Objective	Explain the decomposition of the profit and loss (P&L) for a bond position or portfolio into separate factors including carry roll-down, rate change, and spread change effects.
Reference	Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 11. Bond Yields and Return Calculations.

73. Question

An analyst at a mining company is reviewing the potential cash flow and accounting impact of a 3-year hedge on the company's copper production. The hedge was established by selling 100 three-year futures contracts at USD 3.00 per pound of copper on December 31, 2022, with each contract representing 25,000 pounds of copper. The analyst uses the following information:

Date	Futures price (USD)
December 31, 2022	3.00
December 31, 2023	2.95
December 31, 2024	3.10
December 31, 2025	3.15

The company uses hedge accounting and reports cash flows due to variation margin on the hedge at the end of each calendar year. Which of the following is the best estimate to reported cash flow on December 31, 2024?

A A cash inflow of USD 125,000

B A cash outflow of USD 250,000

C A cash outflow of USD 375,000

D A cash outflow of USD 500,000

Correct Answer C

Explanation C is correct. Under hedge accounting the gain or loss on the hedge will not be realized on accounting statements but the cash flow will still occur through variation margin in the second calendar year. This is an outflow of USD 375,000 = (2.95-3.10)*100*25,000.

A is incorrect. This cash inflow would occur on Dec 31, 2023. First fiscal year: (3-2.95)*25,000*100 = 125,000.

B is incorrect. This is the accounting treatment of the gain or loss on the hedge: (3.00-3.10)*25,000*100 = -250,000.

D is incorrect. This is the accounting treatment of the gain or loss on the hedge over 3 years. (3.00-3.15)*25,000*100 = -500,000

Section Financial Markets and Products

Learning Objective Describe the application of marking to market and hedge accounting for futures.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 7. Futures Markets.

74. Question A junior trader at an investment company is studying the structure of futures markets and the related spot markets for their underlying assets. The trader wants to identify any relationships that exist between the price movements in each market and any specific trades that can be recommended based on these relationships. Which of the following is correct regarding futures prices and spot prices?

A Futures prices may vary widely from the spot price of the underlying asset, but the two prices will typically converge as a futures contract approaches maturity.

B Arbitrageurs keep the futures price and the underlying spot price close to each other throughout the life of the contract.

C If the futures price is above the underlying spot price during the delivery period, a trader can profit by buying futures contracts and selling the underlying asset in the spot market.

D The S&P 500 futures contract has the most trading activity of any futures contract due to its requirement to take physical delivery on the delivery date.

Correct Answer A

Explanation A is correct. Futures prices typically converge toward the spot price of the underlying asset as a futures contract approaches maturity.

B is incorrect. Arbitrageurs will play a vital role in the convergence of futures prices and underlying spot prices during the delivery period.

C is incorrect. If the futures price is above the underlying spot price during the delivery period, an opportunistic trader should sell the futures contract and buy the asset in the spot market.

D is incorrect. The S&P 500 futures contract is cash settled so there is no trading activity related to taking physical delivery.

Section Financial Markets and Products

Learning Objective Explain the convergence of futures and spot prices.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 7. Futures Markets.

75. Question An emerging market bank that has previously calculated operational risk capital using the basic indicator approach will begin using the Basel II standardized approach instead, having just met the necessary criteria for doing so. Which of the following correctly describes a way in which the bank's operational risk capital calculations will change?

A The calculations will be based on a percentile of a loss distribution rather than a percentage applied to gross income.

B The calculations will need to be broken down by the operational risk types defined by the Basel Committee.

C The calculations will need to be broken down by business line.

D The calculations will now need to include a Business Indicator component.

Correct Answer C

Explanation C is correct. The basic indicator approach sets risk capital equal to 15% of the bank's 3-year average annual gross income. The standardized approach is similar, except that separate calculations are carried out by business line and the percentage applied to gross income varies across business lines.

A is incorrect. The advanced measurement approach, not the standardized approach, treats operational risk like credit risk and sets capital equal to the 99.9 percentile of the loss distribution minus the expected operational loss.

B is incorrect. The advanced measurement approach, not the standardized approach, estimates the 99.9 percentile of the 1-year loss for every combination of business lines and the seven operational risk types identified by the Basel Committee.

D is incorrect. The Business Indicator is used in the standardized measurement approach developed under revisions to Basel III, not the standardized approach.

Section Valuation and Risk Models

Learning Objective Compare the basic indicator approach, the standardized approach, and the advanced measurement approach for calculating operational risk regulatory capital.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 7. Operational Risk.

76. Question A risk manager is deciding between buying a futures contract on an exchange and entering into a forward contract directly with a counterparty on the same underlying asset. Both contracts would have the same maturity and delivery specifications. The manager finds that the futures price is lower than the forward price. Assuming no arbitrage opportunity exists, and interest rates are expected to increase, what single factor acting
alone would be a realistic explanation for this price difference?

A The futures contract is less liquid than the forward contract.

B A futures contract offers more flexible terms than a forward contract.

C The price of the underlying asset is strongly negatively correlated with interest rates.

D The upfront transaction cost on the futures contract is higher than that on the forward contract.

Correct Answer C

Explanation C is correct. When an asset is strongly negatively correlated with interest rates, futures prices will tend to be slightly lower than forward prices. When the underlying asset increases in price, the immediate gain arising from the daily futures settlement will tend to be invested at a lower than average rate of interest due to the negative correlation. In this case, futures would sell for slightly less than forward contracts, which are not affected by interest rate movements in the same manner since forward contracts do not have a daily settlement feature.

A is incorrect. Forward contracts are less liquid than futures contracts. Closing out is not as easy as it is for futures contracts.

B is incorrect. Because futures contracts are traded on an exchange, they are standardized financial products. Forward contracts are traded over the counter, and their terms can be chosen to meet the needs of the counterparties.

D is incorrect. Neither type of contract has upfront transaction costs.

Section Financial Markets and Products

Learning Objective Explain the relationship between forward and futures prices.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 10. Pricing Financial Forwards and Futures.

77. Question A commodity trader is researching factors that impact the prices of commodity futures contracts. In addition to the supply and demand dynamics, the advisor identifies storage costs, lease rates, and convenience yields as factors that can influence commodity futures prices. Which of the following statements best describes one of these factors?

A Storage cost is the main factor influencing the prices of long-term commodity futures contracts on industrial metals.

B Lease rates on commodities are typically equal to the relevant risk-free interest rate and have a lower bound of zero.

C Storage costs of agricultural commodities cause futures prices to display a mixture of normal and inverted pricing patterns.

D Convenience yield is a charge subtracted from the lease rate by the lender of a commodity.

Correct Answer C

Explanation C is correct. The seasonal nature of supply causes producers to store agricultural commodities, incurring storage costs and causing futures prices to display both normal and inverted pricing patterns in the term structure.

A is incorrect. Storage costs of commodities are generally very low compared to the price of the commodity and can therefore be ignored. F = S*exp[(C-Y)*T], where C is a cost of carry and Y is the convenience yield.

B is incorrect. The lease rate for an investment commodity is the interest rate charged to borrow the underlying asset, occasionally the lease rate is negative and may therefore allow arbitrageurs to buy the metal and sell it forward for a profit.

D is incorrect. The convenience yield is added to the lease rate and measures the extent to which an owner of a consumption asset values holding quantities of the asset readily available as inventory.

Section Financial Markets and Products

Learning Objective Define and apply commodity concepts such as storage costs, carry markets, lease rate, and convenience yield.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 11. Commodity Forwards and Futures.

78. Question A bond fund manager has requested quotes from a bond dealer on two bonds, Bond X and Bond Y, with the same maturity date and coupon rate. The dealer informs the manager that Bond X trades at a spread of 30 bps over the Treasury market, while Bond Y trades at a spread of 70 bps. Which of the following statements is a correct conclusion for the manager to make?

A Bond X earns a lower return than that of the comparable Treasury bond, since its spread serves to increase the discount rate of its cash flows.

B The price of Bond X is currently higher than the price of Bond Y.

C To equate the present value of Bond Y's cash flows to its face value, 70 bps would need to be added to the yield to maturity of a Treasury bond with comparable maturity.

D The spread differential indicates that there is a 0.4% difference in price between Bond X and Bond Y.

Correct Answer B

Explanation B is correct. Spread is a measure of the excess return earned on a bond over the return provided by a reference security or securities (e.g. Treasury securities). Because the cash flows offered by the reference security are discounted by the appropriate forward rates, adding a spread to these rates serves to decrease the corresponding discount factors. The larger the spread, the greater the decrease in the discount factors, therefore the lower the bond price. Thus, the price of Bond Y (with its 70 bps spread) is lower than the price of Bond X (with its 30 bps spread).

A is incorrect. As mentioned above, spreads can be interpreted as the excess return earned over the return provided by the comparable reference security. Bond X's positive spread indicates a higher return than the Treasury bond.

C is incorrect. Spreads are applied to the forward rate curve of the reference security, not its yield to maturity.

D is incorrect. This is not a valid application of spreads.

Section Valuation and Risk Models

Learning Objective Define and interpret the spread of a bond and explain how a spread is derived from a bond price and a term structure of rates.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 11. Bond Yields and Return Calculations.

79. Question A Swiss chemical company is considering issuing bonds to finance its planned expansion. A risk analyst involved in the capital raising program at the company is studying the external agency rating process to gain a better understanding of the implications of agency ratings for the firm's financing plans. Which of the following statements is correct?

A Agency ratings tend to produce identical default rates for companies in the same industry but located in different countries.

B Empirically, changes in bond and stock prices tend to be greater in cases of ratings downgrades than ratings upgrades.

C Rating agencies produce point-in-time ratings, as these are designed to provide the best current estimate of future default probabilities.

D Rating agencies provide outlooks to indicate the potential for a change in rating in the short-term, and use watchlists to indicate medium-term changes.

Correct Answer B

Explanation B is correct. Most researchers agree that stock and bond markets' reactions to ratings downgrades are significant, while the reaction to upgrades is less pronounced.

A is incorrect. While rating agencies strive for geographic consistency, historical data shows divergence in default rates between, U.S., European, and emerging market firms.

C is incorrect. Rating agencies produce through-the-cycle ratings, which reflect the long-term creditworthiness of firms, and are consistent with rating agencies' goal of ratings stability.

D is incorrect. Outlooks indicate the most likely direction of a rating over the medium term, while placing a rating on a watchlist indicates a relatively short-term change is anticipated (usually within three months).

Section Valuation and Risk Models

Learning Objective Describe external rating scales, the rating process and the link between ratings and default.

Describe the relationships between changes in credit ratings and changes in stock prices, bond prices, and credit default swap spreads.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 4. External and Internal Credit Ratings.

80. Question A portfolio manager at company ABC is examining the company's outstanding FX exposures as of June 1, 2023. The manager decides to hedge a net receivable of EUR 5,000,000 due on December 1, 2023. On June 1, 2023, the EUR spot rate is USD 1.07 per EUR 1, and the 6-month EUR forward rate is USD 1.10 per EUR 1. The manager investigates whether it is better to lock in the exchange rate by taking a position in the forward contract and locking the selling price in 6 months or to sell a 6-month EUR 5,000,000 call option with a strike price of USD 1.07 per EUR 1. Which of the following statements is most likely correct?

A ABC would be better off by selling an option contract regardless of how large the change in the FX rate is and in which direction EUR moves relative to USD.

B ABC would be better off by entering into a forward contract if EUR appreciates against USD by an amount significantly larger than USD 0.03 per EUR 1 and the call option premium is more than 0.03.

C ABC would be better off by entering into a forward contract if EUR appreciates against USD by less than USD 0.03 per EUR 1.

D ABC would be better off by entering into a forward contract if EUR depreciates against USD by an amount significantly larger than USD 0.03 per EUR 1.

Correct Answer D

Explanation D is correct. If FX rate is below USD 1.07 for EUR 1, the profit on the option is limited to the premium received, but the profit on the forward is larger.

A is incorrect. For example if FX rate is below USD 1.07 for EUR 1, the profit on the option is limited to the premium received, but the profit on the forward is larger.

B is incorrect. This is incorrect because the strike price for the call, 1.07 is different from the forward strike price of 1.10 and ABC receives premium for the option. B can be correct if the call option premium is less than 0.03.

C is incorrect. If the rate is in the range USD 1.07 to USD 1.10 for EUR 1, ABC is still in premium for forward, but has to make a payment on the option, so depending on the amount of premium received by ABC on the option, either scenario can be better off.

Section Financial Markets and Products

Learning Objective Calculate and compare the payoffs from hedging strategies involving forward contracts and options.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 4. Introduction to Derivatives.

81. Question A derivatives trader wants to price a European-style call option on a stock with a strike price of USD 25.00 and a time to maturity of 6 months. The trader observes that the price of a 6-month European-style put option on the same underlying with a USD 25.00 strike price is USD 3.00. The stock price is USD 26.00. A special one-time dividend of USD 1.00 is expected in 3 months. The continuously compounded risk-free rate for all maturities is 5% per year. Which of the following is closest to the no-arbitrage value of the call option?

A USD 2.37

B USD 3.01

C USD 3.63

D USD 4.62

Correct Answer C

Explanation C is correct. From the equation for put-call parity, this can be solved by the following equation:

$$c = S_0 + p - PV(K) - PV(D)$$

where PV represents the present value, so that:

$$PV(K) = K * e^{-rt} \text{ and } PV(D) = D * e^{-rt}$$

where:
p is the put price = USD 3.00
c is the call price = to be determined
K is the strike price of the put option = USD 25.00
D is the dividend = USD 1.00
S_0 is the current stock price = USD 26.00
t is the time to the next dividend = 0.25
T is the time to expiration of the option = 6/12 = 0.5
r is the annual risk-free rate of interest = 5%

Calculating PV(K), the present value of the strike price results in a value of $25.00 * e^{-0.05*0.5}$ or 24.3827, while PV(D) is equal to $1.00 * e^{-0.05*0.25} = 0.9876$. Hence, c = 26.00 + 3.00 – 24.3827 – 0.9876 = USD 3.6297.

A is incorrect. USD 2.37 is the value of the put option if the question is switched (misinterpreted) such that the price of the call option is taken as USD 3.00, and the put-call parity formula is used.

B is incorrect. USD 3.01 is the option price if the strike price, not the present value of the strike price, is used in the put-call parity formula.

D is incorrect. USD 4.62 is the value of the call option if the dividend payment is ignored.

Section Financial Markets and Products

Learning Objective	Explain put-call parity and apply it to the valuation of European and American stock options, with dividends and without dividends, and express it in terms of forward prices.
Reference	Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 13. Properties of Options.

82. Question A trader has purchased an asset-or-nothing put option position on 5,000 shares of stock KRP. The stock is currently trading at USD 52 per share. The option has a strike price of USD 49 and a maturity of 1 month. If the price of the stock at expiration is USD 45, which of the following is the best estimate to the payoff of the asset-or-nothing put option position?

A USD 20,000

B USD 35,000

C USD 225,000

D USD 245,000

Correct Answer C

Explanation C is correct. In an asset-or-nothing put, if the price is below the strike the option holder is paid an amount equal to the price of the asset, which in this case is USD 45 *5,000 = USD 225,000.

A is incorrect. This is the payoff from a standard put option, which would pay (49-45) = USD 4/share, or USD 20,000.

B is incorrect. If the strike is mistaken to be 52 and it was a standard put option, the price would be USD 7/share = USD 35,000.

D is incorrect. This is simply 49 * 5,000.

Section Financial Markets and Products

Learning Objective Identify and describe the characteristics and payoff structure of the following exotic options: gap, forward start, compound, chooser, barrier, binary, lookback, Asian, exchange and basket options.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 15. Exotic Options.

83. Question A US financial institution entered into a 4-year currency swap contract with an industrial company located in France. Under the terms of the swap, the financial institution receives interest at 3% per year in EUR and pays interest at 2% per year in USD. The principal amounts are EUR 50 million and USD 60 million, and interest payments are exchanged once at the end of each year. Immediately before cash flow payments and receipts are exchanged at the end of year 3, the exchange rate is USD 1.044 per EUR 1, the 1-year risk-free rate in France is 3.0%, and the 1-year risk-free rate in the US is 2.0%. Assuming continuous compounding, what is the value of the swap to the financial institution at the end of year 3?

A USD -7.603 million

B USD -7.445 million

C USD -7.068 million

D USD -6.921 million

Correct Answer B

Explanation B is correct.

Step 1 - calculate the forward exchange rate as of the end of year 3: 1-year forward exchange rate (USD per EUR):
$F = S*\exp[(r_{usd} – r_{eur})*T] = 1.044* \exp[(0.02 – 0.03)*1] = 1.0336$ (i.e., Year 4 FX rate)

Step 2 - calculate the expected cash flows as of the end of year 3:
Receipts:
Year 3: EUR 50mil*0.03 = EUR 1.5mil
Year 4: EUR 50mil*0.03 + EUR 50mil = EUR 51.5mil
Payments:
Year 3: USD 60mil*0.02 = USD 1.2mil
Year 4: USD 60mil*0.02 + USD 60mil = USD 61.2mil

Step 3 - convert the EUR cash flows into base currency, i.e. USD:
Receipts:
Year 3: (EUR 1.5mil)*1.0440= USD 1.566mil
Year 4: (EUR 51.5mil)*1.0336 = USD 53.2304mil

Step 4 - Net the cash flows per year:
Year 3: USD 1.566mil – USD 1.2mil = USD 0.366mil
Year 4: USD 53.230 – USD 61.2mil = USD -7.969mil

Step 5 - discount to year 3 and sum the cash flows in USD:
Year 3: Present value = USD 0.366mil
Year 4: Present value = USD -7.969*exp(-0.02*1) = USD -7.8112mil
Net value to the financial institution = 0.366 – 7.8112 = USD -7.4452mil

A is incorrect. USD -7.603 million uses the appropriate exchange rates but does not discount back to year 3.

C is incorrect. USD -7.068 million uses the current USD per EUR rate (USD 1.044) to convert the EUR cash flows and does not discount back to year 3.

D is incorrect. USD -6.921 million uses the current USD per EUR rate (USD 1.044) to convert the EUR cash flows; however, it does discount back to year 3.

Section	Financial Markets and Products
Learning Objective	Explain the mechanics of a currency swap and compute its cash flows.
Reference	Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 20. Swaps.

84. Question A newly hired quantitative analyst at a financial institution has been asked by a portfolio manager to calculate the VaR of a portfolio for 10-, 15-, 20-, and 25-day periods. The portfolio manager notices something wrong with the analyst's calculations. Assuming the annualized volatilities of daily returns for the four periods are equal, and that the daily returns are independently and identically normally distributed with a mean of zero, which of the following VaR estimates for this portfolio is inconsistent with the others?

A VaR(10-day) = USD 474 million

B VaR(15-day) = USD 503 million

C VaR(20-day) = USD 671 million

D VaR(25-day) = USD 750 million

Correct Answer B

Explanation B is correct. Calculate VaR(1-day) from each choice:

$$\text{VaR(10-day)} = 474 \rightarrow \text{VaR(1-day)} = 474/\sqrt{10} = 150$$

$$\text{VaR(15-day)} = 503 \rightarrow \text{VaR(1-day)} = 503/\sqrt{15} = 130$$

$$\text{VaR(20-day)} = 671 \rightarrow \text{VaR(1-day)} = 671/\sqrt{20} = 150$$

$$\text{VaR(25-day)} = 750 \rightarrow \text{VaR(1-day)} = 750/\sqrt{25} = 150$$

Thus, the VaR(1-day) calculated for a 15-day period is different from those calculated for 10-, 20-, and 25-day periods.

A, C, and D are incorrect per the explanation for B above.

Section Valuation and Risk Models

Learning Objective Explain and apply approaches to estimate long horizon volatility/VaR and describe the process of mean reversion according to a GARCH (1,1) model.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 3. Measuring and Monitoring Volatility.

85. Question A portfolio manager uses a valuation model to estimate the value of a bond portfolio at USD 125.00 million. The term structure is flat. Using the same model, the portfolio manager estimates that the value of the portfolio would increase to USD 127.70 million if all interest rates fall by 20 bps and would decrease to USD 122.20 million if all interest rates rise by 20 bps. Using these estimates, which of the following is the effective duration of the bond portfolio closest to?

A 5.5

B 11.0

C 22.0

D 44.0

Correct Answer B

Explanation B is correct. Effective duration is commonly reported as the approximate percentage change in price for every 100 bp change in rates. The calculation follows:

$$D = -\frac{\Delta P/P}{\Delta r} = -\frac{\Delta P}{P\Delta r} = \frac{127.70 - 122.20}{125.00 * (2 * 0.002)} = 11.0$$

A is incorrect. 5.5 is the result of using switching the prices of USD 122.20 and USD 125.00 in the formula.

C is incorrect. 22 is the result when the “2” multiple in the denominator is not applied.

D is incorrect. 44 is the result obtained if the “2” multiple is applied to the numerator instead of the denominator.

Section Valuation and Risk Models

Learning Objective Define, compute, and interpret the effective duration of a fixed income security given a change in yield and the resulting change in price.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 12. Applying Duration, Convexity, and DV01.

86. Question A portfolio manager is calculating the realized return and the historical volatility of returns for the stock of company VMG. The stock ended the month of June 2021 at a price per share of INR 280, and ended the month of December 2021 at INR 320. The manager reports that the monthly volatility of the stock returns over the 6-month period was 2.76%. Assuming continuous compounding, and that the stock's returns are independent over time, what are the realized return over the 6-month period and the volatility of the stock returns per year?

A The realized return is 12.5%, and the annual volatility is 9.6%.

B The realized return is 12.5%, and the annual volatility is 33.1%.

C The realized return is 26.7%, and the annual volatility is 9.6%.

D The realized return is 26.7%, and the annual volatility is 33.1%.

Correct Answer C

Explanation C is correct.

Given:

T = 6 months = 6/12 = 0.5

$S_0 = 280$

$S_T = 360$

Therefore,

- Realized return = $(1/T)*ln(S_T/S_0)$ = 2*ln(320/280) = 0.2671 = 26.7%
- Volatility per year = $s/sqrt(\Delta t)$ = 0.0276*(sqrt(12)) = 0.0276*(sqrt(0.08333)) = 0.0956 = 9.6%.

A is incorrect. 12.5% incorrectly calculates the realized return on the stock as the price change over the period divided by the price at the end of the period (INR 40 / INR 320).

B is incorrect. 33.1% (= 2.76% * 12) is the result of not using the square root rule to determine the annual volatility. The return of 12.5% is calculated as described in A above.

D is incorrect. The annual volatility is incorrectly calculated as described in B above.

Section Valuation and Risk Models

Learning Objective Compute the realized return and historical volatility of a stock.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 15. The Black-Scholes-Merton Model.

87. Question

The CRO of a small bank is estimating the volatility of the bank's asset portfolio using its key rate 01s, in preparation for calculating the bank's market risk capital. The portfolio is only exposed to 2-year and 10-year spot rates. Relevant information on market rates and the portfolio is as follows:

	2-year	10-year
Standard deviation of daily changes in the spot rate (in bps)	4	11
Correlation between spot rate	0.6	0.6
Portfolio key rate 01s (CAD)	52	97

Given the above information, what is the standard deviation of the daily change in portfolio value?

A CAD 516

B CAD 988

C CAD 1,026

D CAD 1,203

Correct Answer D

Explanation D is correct. The equation for the variance of the change in portfolio value is:

$$\sigma_P^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} \rho_{ij}\sigma_i\sigma_j * KR01_i * KR01_j$$

$$= (1 * \sigma_{2Y} * \sigma_{2Y} * KR01_{2Y} * KR01_{2Y}) + (\rho_{2Y,10Y} * \sigma_{2Y} * \sigma_{10Y} * KR01_{2Y} * KR01_{10Y}) + (\rho_{10Y,2Y} * \sigma_{10Y} * \sigma_{2Y} * KR01_{10Y} * KR01_{2Y}) + (1 * \sigma_{10Y} * \sigma_{10Y} * KR01_{10Y} * KR01_{10Y})$$

$$= \sigma_{2Y}^2 * KR01_{2Y}^2 + 2 * (1 * \sigma_{2Y} * \sigma_{2Y} * KR01_{2Y} * KR01_{2Y}) + \sigma_{10Y}^2 * KR01_{10Y}^2$$

$$= [(4)^2 * (52)^2] + [0.6 * 4 * 11 * 52 * 97] + [0.6 * 11 * 4 * 97 * 52] + [(11)^2 * (97)^2]$$

$$= 1{,}448{,}076$$

The standard deviation is therefore: $\sqrt{1{,}448{,}076} = 1{,}203.36$

A is incorrect. This calculates the variance as

$$= [0.6 * 4 * 11 * 52 * 97] + [0.6 * 11 * 4 * 97 * 52]$$

B is incorrect. This calculates the variance as

$$= [0.6 * (4)^2 * (52)^2] + [0.6 * (11)^2 * (97)^2]$$

C is incorrect. This calculates the variance without the KR01 terms, and then multiplies the result by the average of the KR01s.

Section Valuation and Risk Models

Learning Objective	Apply key rate and multi-factor analysis to estimating portfolio volatility.
Reference	Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 13. Modeling Non-Parallel Term Structure Shifts and Hedging.

88. Question The CRO of a major bank is reviewing a new risk measure, W, with the risk team. The CRO runs a test on the new risk measure to determine if the measure is coherent and satisfies the property of translation invariance. Which of the following tests would correctly determine that the risk measure W exhibits translation invariance?

A When cash is added to a portfolio, the value of W for that portfolio should decrease by the amount of cash that is added.

B When W is used to measure the risk of two portfolios A and B, then W(A) + W(B) should be less than or equal to W(A+B).

C When W is used to measure the risk of two portfolios A and B, and if portfolio A always produces a worse outcome than portfolio B, then W(A) should always be higher than W(B).

D When W is used to measure the risk of portfolio A, and if all exposures in portfolio A are increased by a constant factor, then W(A) should increase proportionally by that factor.

Correct Answer A

Explanation A is correct. According to the property of translation invariance, adding an amount of cash, K, into a portfolio will decrease the risk measure by K. Therefore, choice A correctly describes translation invariance.

B is incorrect. This is a test for subadditivity. According to the property of subadditivity, given two portfolios A and B, the risk measure for the portfolio formed by merging A and B will be less than or equal to the sum of the risk measures for A and B.

C is incorrect. This is a test for monotonicity. According to the property of monotonicity, a portfolio that produces consistently worse results in comparison to another portfolio will have a higher risk measure.

D is incorrect. This is a test of homogeneity. According to the property of homogeneity, changing the size of a portfolio by multiplying the amount of all components by λ results in the risk measure being multiplied by λ.

Section Valuation and Risk Models

Learning Objective Define the properties of a coherent risk measure and explain the meaning of each property.

Reference Global Association of Risk Professionals. Valuation and Risk Models. New York, NY: Pearson, 2022. Chapter 1. Measures of Financial Risk.

89. Question

On November 1, the fund manager of a USD 60 million US mid-to-large cap equity portfolio, considers locking in the profit from a recent market rally. The S&P 500 Index is trading at 2,110. The S&P 500 Index futures with a multiplier of 250 is trading at 2,120. Instead of selling the holdings, the fund manager would rather hedge two-thirds of the market exposure over the remaining 2 months. Given that the correlation between the equity portfolio and the S&P 500 Index futures is 0.89 and the volatilities of the equity portfolio and the S&P 500 futures are 0.51 and 0.48 per year, respectively, what position should the manager take to achieve the objective?

A Sell 63 futures contracts of the S&P 500 Index

B Sell 67 futures contracts of the S&P 500 Index

C Sell 71 futures contracts of the S&P 500 Index

D Sell 107 futures contracts of the S&P 500 Index

Correct Answer: C

Explanation: C is correct. The optimal hedge ratio is the product of the correlation coefficient between the change in the spot price and the change in futures price and the ratio of the volatility of the equity fund to the volatility of the futures.
Computing the optimal hedge ratio: h = 0.89 * (0.51/0.48) = 0.9456
Two-thirds of the equity fund valued at USD 60 million is equivalent to USD 40 million. Computing the number of futures contracts: N = (hedge ratio)*(portfolio value)/futures value = 0.9456 * 40,000,000/(2,120 * 250) = 71.3679 = 71, rounded to nearest integer.

A is incorrect. h is calculated as 0.89 * (0.48/0.51) = 0.8376.

B is incorrect. Instead of h just 0.89 is used in the formula.

D is incorrect. The full amount was hedged instead of 2/3.

Section: Financial Markets and Products

Learning Objective: Compute the optimal number of futures contracts needed to hedge an exposure and explain and calculate the “tailing the hedge” adjustment.

Reference: Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 8. Using Futures for Hedging.

90. Question

A bond trader is using current zero rates to calculate forward rates. The trader gathers the following information on the current term structure of continuously compounded zero rates:

Maturity in years	Zero rate (%)
1	1.50
2	2.00
3	2.50
4	3.00
5	3.50

Which of the following is closest to the 2-year forward rate starting in 3 years?

A 3.50%

B 4.17%

C 5.00%

D 6.09%

Correct Answer C

Explanation C is correct. The 2-year forward rate starting in 3 years is given by
${}_3F_2 = (R_5 * 5 – R_3 * 3)/ (5 -3) = 5\%$
where:
R_3 = 3-year zero rate = 2.50%,
R_5 = 5-year zero rate = 3.50%,
${}_3F_2$ = 2-year forward rate in year 3.

A is incorrect. 3.50% is the zero rate (spot rate) for a 5-year investment.

B is incorrect. 4.17% is the annualized 3-year forward rate starting in 2 years. That is, it is the result obtained when the formula is misrepresented as follows:
${}_3F_2 = (R_5 * 5 – R_3 * 2)/(5 -2)$.

D is incorrect. 6.09% is the result when the following wrong formula is applied to determine the 2-year forward rate starting in year 3 $(1 + {}_3R_2) = (1 + R_5)*(1 + R_3)$.

Section Financial Markets and Products

Learning Objective Derive forward interest rates from a set of spot rates.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 16. Properties of Interest Rates.

91. Question A quantitative analyst at a foreign exchange (FX) trading company is developing a new factor model to be used for estimating potential risk exposures on FX trades. The analyst is evaluating potential factors to use in the model, and their effects on the performance of the model. Which of the following statements is most likely correct for the analyst to consider when developing the model?

A Using a large number of underlying factors will allow the model to correctly predict future exchange rates.

B The most important factor in predicting a country's interest rates is the political stability of the country.

C The pair-wise exchange rates for currencies of developed countries can be assumed to be constant for terms shorter than 3 months.

D The value of a country's currency will be negatively correlated with a factor representing changes in that country's money supply.

Correct Answer D

Explanation D is correct. As described in the text, "If Country A increases its money supply by 25% while Country B keeps its money supply unchanged, the value of Country A's currency will tend to decline by 25% relative to Country B's currency."

A is incorrect. Future exchange rates cannot be predicted with any precision.

B is incorrect. While political instability would weaken a currency, supply and demand are the most important factors.

C is incorrect. Exchange rates should be assumed to change even in short-term time horizons.

Section Financial Markets and Products

Learning Objective Identify and explain the factors that determine exchange rates.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 9. Foreign Exchange Markets.

92. Question

A currency analyst is examining the exchange rate between the USD and the EUR. The analyst observes the following market data:

- Current USD per EUR 1 exchange rate: 1.13
- Current USD-denominated 1-year risk-free interest rate: 2.7% per year
- Current EUR-denominated 1-year risk-free interest rate: 1.7% per year

According to interest rate parity, what is the 2-year forward USD per EUR 1 exchange rate?

A 1.1081

B 1.1190

C 1.1411

D 1.1523

Correct Answer D

Explanation

D is correct. The forward rate, F, is given by the interest rate parity equation:
$F = S*(1 + R_{USD})^T/(1 + R_{EUR})^T$
where:
S is the spot exchange rate,
R_{USD} is the USD risk-free rate,
R_{EUR} is the EUR risk-free rate, and
T is the time to delivery.

Substituting the values in the equation:
$F = 1.13*(1 + 0.027)^2/(1 + 0.017)^2 = 1.1523$

A is incorrect. USD 1.1081 per EUR 1 is the 2-year forward exchange rate when the 1-year risk-free rates for the two countries are switched in the formula.

B is incorrect. USD 1.1190 per EUR 1 is the 1-year forward exchange rate when the 1-year risk-free rates for the two countries are switched in the formula.

C is incorrect. USD 1.1411 per EUR 1 is the 1-year forward exchange rate, not the 2-year forward rate.

Section Financial Markets and Products

Learning Objective Calculate the forward price given the underlying asset's spot price and describe an arbitrage argument between spot and forward prices.

Reference Global Association of Risk Professionals. Financial Markets and Products. New York, NY: Pearson, 2022. Chapter 10. Pricing Financial Forwards and Futures.

93. Question Two risk analysts are attending a seminar on the topic of modern portfolio theory. One of the presentations in the seminar focuses on the efficient frontier, the capital market line, and the CAPM. Assuming the CAPM holds, which of the following observations is correct for the analysts to make?

A The capital market line always has a positive slope and its steepness depends on the market risk premium and the volatility of the market portfolio.

B The capital market line is the straight line connecting the risk-free asset with the zero-beta minimum-variance portfolio.

C The portfolio of risky assets with the lowest standard deviation on the efficient frontier is typically held by the least risk averse investors.

D The efficient frontier indicates that different individuals hold different portfolios of risky assets based upon their individual forecasts for asset returns.

Correct Answer A

Explanation A is correct. The capital market line connects the risk-free asset with the market portfolio, which is the efficient portfolio at which the capital market line is tangent to the efficient frontier. The equation of the capital market line is as follows:

$$\bar{R}_e = R_F + \left(\frac{\bar{R}_M - R_F}{\sigma_M}\right) * \sigma_e$$

where the subscript e denotes an efficient portfolio. Since the shape of the efficient frontier is dictated by the market risk premium, R¯_M-R_F, and the volatility of the market, the slope of the capital market line will also be dependent on these two factors.

B is incorrect. As said in A above, the capital market line connects the risk-free asset with the market portfolio (which by definition has a beta of 1).

C is incorrect. The implication of the CML is that all investors should allocate to two investments: the risk-free asset and the market portfolio. Investors with little tolerance for risk will allocate most of their funds to the risk-free asset.

D is incorrect. One of the crucial assumptions for the derivation of CAPM is that all market participants have the same expectations, and therefore have the same forecast for asset returns. Additionally, as mentioned above, all investors hold the same portfolio of risky assets, which is the market portfolio.

Section Foundations of Risk Management

Learning Objective Understand the derivation and components of the CAPM.

Interpret and compare the capital market line and the security market line.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 5. Modern Portfolio Theory and the Capital Asset Pricing Model.

94. Question An analyst at a family endowment fund is studying the use of a factor analysis approach to hedge an investment portfolio. The analyst reviews the characteristics of factor analysis and best practices in implementing the approach. Which of the following statements is correct for the analyst to make?

A Factor betas can be used in the process of hedging idiosyncratic risk, but they cannot be used in hedging systematic risk.

B Choosing the frequency to adjust factor-based hedges requires making a decision that balances the hedging cost and the tracking error.

C Factor hedging performs well when linear factor models are used, but performs poorly when nonlinear factor models are used.

D While an investor can take positions in factors to construct a portfolio with a beta close to zero, the investor cannot theoretically construct a portfolio with a beta exactly equal to zero.

Correct Answer B

Explanation B is correct. Determining how often a hedge needs to be adjusted is a key challenge. There is a tradeoff between the cost of hedging and the need to keep the hedge aligned to the portfolio. If the hedging strategy is not implemented on a continuous basis, then tracking errors will appear. If the hedging strategy is updated too frequently, trading costs will be high and drag down overall performance.

A is incorrect. While idiosyncratic (i.e., specific) risk can theoretically be eliminated through diversification, the same is not true for systematic risk. However, factor betas can be used to construct a hedging strategy to eliminate systematic risk.

C is incorrect. Factor hedging could be based on either a linear or nonlinear model. Either could have a sound hedging effect. What is challenging is model risk, which includes both factor model errors and the potential for errors in implementation. Factor model errors occur when a model contains mathematical errors or is based on misleading/inappropriate assumptions. For example, a hedging strategy that is based on linear factor models that fail to capture nonlinear relationships among the factors will be flawed.

D is incorrect. The goal of hedging out all the factor risks and creating a zero-beta portfolio can theoretically be achieved by taking the opposite positions in each of the factors so that the combined portfolio contains no factor exposures. This is theoretically possible, although in practice some slight beta exposure might be left due to rounding the hedging instruments to the nearest single unit.

Section Foundations of Risk Management

Learning Objective Explain how to construct a portfolio to hedge exposure to multiple factors.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 6. The Arbitrage Pricing Theory and Multifactor Models of Risk and Return.

95. Question The CRO of a bank is evaluating the bank's practices for the management of risk data. The CRO notes that in characterizing various dimensions of the bank's data, the Basel Committee has suggested several principles to promote strong and effective risk data aggregation capabilities. Which statement correctly describes a recommendation that the bank should follow in accordance with the Basel Committee's principles for effective risk data aggregation and risk reporting?

A The integrity principle recommends that data aggregation be completely automated without any manual intervention.

B The completeness principle recommends that a financial institution capture data on its entire scope of material risk exposures.

C The adaptability principle recommends that a bank frequently update its risk reporting systems to incorporate changes in best practices.

D The governance principle recommends that the risk data be reconciled with management's rough approximations of risk exposure prior to aggregating the data.

Correct Answer B

Explanation B is correct. The completeness principle recommends that a bank be able to capture and aggregate all data on the material risks to which it is exposed across the organization. This will allow it to identify and report risk exposures, concentrations, and set exposure limits.

A is incorrect. The integrity principle recommends that a bank should be able to generate accurate and reliable risk data to meet normal and stress/crisis reporting accuracy requirements. Data should be aggregated on a largely (but not completely) automated basis to minimize the probability of errors.

C is incorrect. The adaptability principle recommends that a bank should be able to generate aggregate risk data to meet a broad range of on-demand, ad hoc risk management reporting requests, including requests during stress/crisis situations, requests due to changing internal needs, and requests to meet supervisory queries.

D is incorrect. The accuracy principle (principle 7) states that risk management reports should accurately and precisely convey aggregated risk data and reflect risk in an exact manner. Reports should be reconciled and validated.

Section Foundations of Risk Management

Learning Objective Describe key governance principles related to risk data aggregation and risk reporting.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 7. Principles for Effective Data Aggregation and Risk Reporting.

96. Question A risk analyst at a growing bank is concerned about a loan exposure to a large manufacturing company which is losing significant market share in its industry. The analyst considers the use of different credit risk transfer mechanisms, including CDS, to manage this exposure. Which of the following statements correctly describes an appropriate benefit of using CDS in this situation?

A CDS quantify the manufacturing company's default risk and allow the bank to monitor changes in this risk on a real-time basis.

B CDS provide an agreement to periodically revalue the loan and transfer any net value change.

C CDS require the manufacturing company to pay back the loan in full at an earlier point in time.

D CDS allow the bank to offset its exposure to the company with loan exposures to other manufacturing companies.

Correct Answer A

Explanation A is correct. CDS (or credit default swaps) are credit derivatives that quantify a company's default risk and allow the bank to monitor changes in the company's default risk on a real-time basis. This is an improvement over credit ratings, which only update assessments of companies' default risk on a periodic basis.

B is incorrect. This would be a feature of marking-to-market/margining.

C is incorrect. This would be an example of a termination/put option mechanism.

D is incorrect. CDS do not provide an offset using loan exposures to other counterparties. A separate transfer mechanism, netting, can be used to offset negative and positive exposures to the same counterparty but this statement does not correctly describe netting either.

Section Foundations of Risk Management

Learning Objective Compare different types of credit derivatives, explain their applications, and describe their advantages.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 4. Credit Risk Transfer Mechanisms.

97. Question

An insurance company estimates that 40% of policyholders who have only an auto policy will renew next year, and 70% of policyholders who have only a homeowner policy will renew next year. The company estimates that 80% of policyholders who have both an auto and a homeowner policy will renew at least one of those policies next year. Company records show that 70% of policyholders have an auto policy, 50% of policyholders have a homeowner policy, and 20% of policyholders have both an auto and a homeowner policy. Using the company's estimates, what is the percentage of policyholders that will renew at least one policy next year?

A 29%

B 41%

C 53%

D 57%

Correct Answer D

Explanation D is correct. Let:
A = event that a policyholder has an auto policy
H = event that a policyholder has a homeowner policy

Then, based on the information given:
$P(A \cap H) = 0.20$
$P(A \cap H^c) = P(A) - P(A \cap H) = 0.70 - 0.20 = 0.50$
$P(A^c \cap H) = P(H) - P(A \cap H) = 0.50 - 0.20 = 0.30$

Therefore, the proportion of policyholders that will renew at least one policy is shown below:
$0.40 * P(A \cap H^c) + 0.70 * P(A^c \cap H) + 0.80 * P(A \cap H)$
$= 0.40 * 0.50 + 0.70 * 0.30 + 0.80 * 0.20 = 0.57$

Section Quantitative Analysis

Learning Objective Define and calculate a conditional probability.

Distinguish between conditional and unconditional probabilities.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 1. Fundamentals of Probability.

98. Question A risk manager is calculating the VaR of a fund with a data set of 25 weekly returns. The mean weekly return is 7% and the standard deviation of the return series is 15%. Assuming that weekly returns are independent and identically distributed, what is the standard deviation of the mean weekly return?

A 0.4%

B 0.7%

C 3.0%

D 10.0%

Correct Answer C

Explanation C is correct. In order to calculate the standard deviation of the mean weekly returns, we must divide the standard deviation of the return series by the square root of the sample size. Therefore, the correct answer is 15%/sqrt (25) = 3%.

Section Quantitative Analysis

Learning Objective Estimate the mean, variance, and standard deviation using sample data.

Reference Global Association of Risk Professionals. Quantitative Analysis. New York, NY: Pearson, 2022. Chapter 5. Sample Moments.

99. Question

An analyst is analyzing the historical performance of two commodity funds tracking the Reuters/Jefferies-CRB® Index as benchmark. The analyst collated the data on the monthly returns and decided to use the information ratio (IR) to assess which fund achieved higher returns more efficiently, and presented the findings as shown below:

	Fund 1	Fund 2	Benchmark
Average monthly return	1.488%	1.468%	1.415%
Average excess return	0.073%	0.053%	0.000%
Standard deviation of	0.294%	0.237%	0.238%
Tracking error	0.344%	0.341%	0.000%

What is the information ratio for each fund, and what conclusion can be drawn?

A IR for Fund 1 = 0.212, IR for Fund 2 = 0.155; Fund 1 performed better as it has a higher IR.

B IR for Fund 1 = 0.212, IR for Fund 2 = 0.155; Fund 2 performed better as it has a lower IR.

C IR for Fund 1 = 0.248, IR for Fund 2 = 0.224; Fund 1 performed better as it has a higher IR.

D IR for Fund 1 = 0.248, IR for Fund 2 = 0.224; Fund 2 performed better as it has a lower IR.

Correct Answer: A

Explanation: A is correct. The information ratio may be calculated by either a comparison of the residual return to residual risk or the excess return to tracking error. The higher the IR, the better 'informed' the manager is at picking assets to invest in. Since neither residual return nor risk is given, only the latter is an option.

$$IR = E(R_p - R_b)/\text{Tracking Error}$$

For Fund 1: IR = 0.00073/0.00344 = 0.212; For Fund 2: IR = 0.00053/0.00341 = 0.155

Section: Foundations of Risk Management

Learning Objective: Calculate, compare, and interpret the following performance measures: the Sharpe performance index, the Treynor performance index, the Jensen performance index, the tracking error, information ratio, and Sortino ratio.

Reference: Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 5. Modern Portfolio Theory and the Capital Asset Pricing Model.

100. Question

An analyst is estimating the sensitivity of the return of stock A to different macroeconomic factors. The following estimates for the factor betas are prepared:

$$\beta_{\text{Industrial production}} = 1.30 \quad \beta_{\text{interest rate}} = -0.75$$

Under baseline expectations, with industrial production growth of 3.0% and an interest rate of 1.5%, the expected return for Stock A is estimated to be 5.0%. The economic research department is forecasting an acceleration of economic activity for the following year, with industrial production forecast to grow 4.2% and interest rates increasing 25 bps to 1.75%. According to this forecast, what return of Stock A can be expected for next year?

A 4.8%

B 6.4%

C 6.8%

D 7.8%

Correct Answer B

Explanation B is correct. The expected return for Stock A equals the expected return for the stock under the baseline scenario, plus the impact of "shocks," or excess returns of, both factors. Since the baseline scenario incorporates 3% industrial production growth and a 1.5% interest rate, the "shocks" are 1.2% for the industrial production factor and 0.25% for the interest rate factor.

Therefore, the expected return for the new scenario = $\beta_{\text{Industrial production}}$ * Industrial production shock + $\beta_{\text{interest rate}}$ * Interest rate shock or 5% + (1.3 * 1.2%) + (-0.75 * 0.25%) = 6.37%.

Section Foundations of Risk Management

Learning Objective Calculate the expected return of an asset using a single-factor and a multifactor model.

Reference Global Association of Risk Professionals. Foundations of Risk Management. New York, NY: Pearson, 2022. Chapter 6. The Arbitrage Pricing Theory and Multifactor Models of Risk and Return.

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