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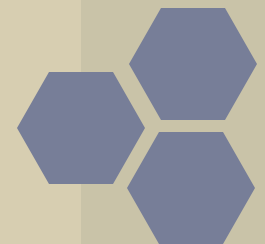


CFA Level I

Quantitative Methods

Introduction

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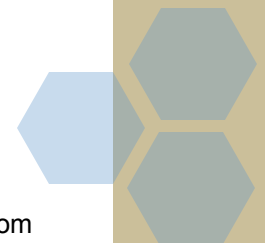




Weight of Quantitative Methods

Topic Area	Level I	Level II	Level III
Ethical and Professional Standards	15	10-15	10-15
Quantitative Methods	12	5-10	0
Economics for Valuation	10	5-10	5-15
Financial Reporting and Analysis	20	15-20	0
Corporate Finance	7	5-15	0
Equity Investments	10	15-25	5-15
Fixed Income	10	10-20	10-20
Derivatives	5	5-15	5-15
Alternative Investments	4	5-10	5-15
Portfolio Management and Wealth Planning	7	5-10	40-55
Total	100	100	100

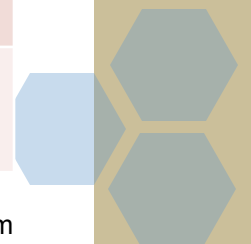
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Overview of LOS

The Time Value of Money

1. Interpret interest rates as required rates of return, discount rate, or opportunity costs.
2. Explain an interest rate as the sum of a real risk-free rate and premiums that compensate investors for bearing distinct types of risk.
3. Calculate and interpret the effective annual rate, given the stated annual interest rate and the frequency of compounding.
4. Solve time value of money problems for different frequencies of compounding.
5. Calculate and interpret the future value (FV) and present value (PV) of a single sum of money, an ordinary annuity, an annuity due, a perpetuity(PV only), and a series of unequal cash flows.
6. Demonstrate the use of a time line in modeling and solving time value of money problems.



Overview of LOS

Discounted Cash Flow Applications

1. Calculate and interpret the net present value (NPV) and the internal rate of return (IRR) of an investment.
2. Contrast the NPV rule to the IRR rule, and identify problems associated with the IRR rule.
3. Calculate and interpret a holding period return (total return).
4. Calculate and compare the money-weighted and time-weighted rates of return of a portfolio and evaluate the performance of portfolios based on these measures.
5. Calculate and interpret the bank discount yield, holding period yield, effective annual yield, and money market yield for US Treasury bills and other money market instruments.
6. Convert among holding period yields, money market yields, effective annual yields, and bond equivalent yields.



Overview of LOS

Statistical Concepts and Market Returns

1. Distinguish between descriptive statistics and inferential statistics, between a population and a sample, and among the types of measurement scales.
2. Define a parameter, a sample statistic, and a frequency distribution.
3. Calculate and interpret relative frequencies and cumulative relative frequencies, given a frequency distribution.
4. Describe the properties of a data set presented as a histogram or a frequency polygon.
5. Calculate and interpret measures of central tendency, including the population mean, sample mean, arithmetic mean, weighted average or mean, geometric mean, harmonic mean, median, and mode.
6. Calculate and interpret quartiles, quintiles, deciles, and percentiles.
7. Calculate and interpret 1) a range and a mean absolute deviation and 2) the variance and standard deviation of a population and of a sample.



Overview of LOS

Statistical Concepts and Market Returns

8. Calculate and interpret the proportion of observations falling within a specified number of standard deviations of the mean using Chebyshev's inequality.

9. Calculate and interpret the coefficient of variation and the Sharpe ratio.

10. Explain skewness and the meaning of a positively or negatively skewed return distribution.

11. Describe the relative locations of the mean, median, and mode for a unimodal, nonsymmetrical distribution.

12. Explain measures of sample skewness and kurtosis.

13. Compare the use of arithmetic and geometric means when analyzing investment returns.



Overview of LOS

Probability Concepts

1. Define a random variable, an outcome, an event, mutually exclusive events, and exhaustive events.
2. State the two defining properties of probability and distinguish among empirical, subjective, and a priori probabilities.
3. State the probability of an event in terms of odds for and against the event.
4. Distinguish between unconditional and conditional probabilities.
5. Explain the multiplication, addition, and total probability rules.
6. Calculate and interpret 1) the joint probability of two events, 2) the probability that at least one of two events will occur, and 3) a joint probability of any number of independent events.
7. Distinguish between dependent and independent events.
8. Calculate and interpret an unconditional probability using the total probability rule.



Overview of LOS

Probability Concepts

9. Explain the use of conditional expectation in investment applications.
10. Explain the use of a tree diagram to represent an investment problem.
11. Calculate and interpret covariance and correlation.
12. Calculate and interpret the expected value, variance, and standard deviation of a random variable and of returns on a portfolio.
13. Calculate and interpret covariance given a joint probability function.
14. Calculate and interpret an updated probability using Bayes' formula.
15. Identify the most appropriate method to solve a particular counting problem and solve counting problems using factorial, combination, and permutation concepts.



Overview of LOS

Common Probability Distributions

1. Define a probability distribution and distinguish between discrete and continuous random variables and their probability functions.
2. Describe the set of possible outcomes of a specified discrete random variable.
3. Interpret a cumulative distribution function.
4. Calculate and interpret probabilities for a random variable, given its cumulative distribution function.
5. Define a discrete uniform random variable, a Bernoulli random variable, and a binomial random variable.
6. Calculate and interpret probabilities given the discrete uniform and the binomial distribution functions.
7. Construct a binomial tree to describe stock price movement.
8. Calculate and interpret tracking error.
9. Define the continuous uniform distribution and calculate and interpret probabilities, given a continuous uniform distribution.



Overview of LOS

Common Probability Distributions

10. Explain the key properties of the normal distribution.
11. Distinguish between a univariate and a multivariate distribution and explain the role of correlation in the multivariate normal distribution.
12. Determine the probability that a normally distributed random variable lies inside a given interval.
13. Define the standard normal distribution, explain how to standardize a random variable, and calculate and interpret probabilities using the standard normal distribution.
14. Define shortfall risk, calculate the safety-first ratio, and select an optimal portfolio using Roy's safety-first criterion.
15. Explain the relationship between normal and lognormal distributions and why the lognormal distribution is used to model asset prices.
16. Distinguish between discretely and continuously compounded rates of return and calculate and interpret a continuously compounded rate of return, given a specific holding period return.
17. Explain Monte Carlo simulation and describe its applications and limitations.
18. Compare Monte Carlo simulation and historical simulation.



Overview of LOS

Sampling and Estimation

1. Define simple random sampling and a sampling distribution.
2. Explain sampling error.
3. Distinguish between simple random and stratified random sampling.
4. Distinguish between time-series and cross-sectional data.
5. Explain the central limit theorem and its importance.
6. Calculate and interpret the standard error of the sample mean.
7. Identify and describe desirable properties of an estimator.
8. Distinguish between a point estimate and a confidence interval estimate of a population parameter.
9. Describe properties of Student's t-distribution and calculate and interpret its degrees of freedom.
10. Calculate and interpret a confidence interval for a population mean
11. Describe the issues regarding selection of the appropriate sample size, data-mining bias, sample selection bias, survivorship bias, look-ahead bias, and time-period bias.



Overview of LOS

Hypothesis Testing

1. Define a hypothesis, describe the steps of hypothesis testing, and describe and interpret the choice of the null and alternative hypotheses.
2. Distinguish between one-tailed and two-tailed tests of hypotheses.
3. Explain a test statistic, Type I and Type II errors, a significance level, and how significance levels are used in hypothesis testing.
4. Explain a decision rule, the power of a test, and the relation between confidence intervals and hypothesis tests.
5. Distinguish between a statistical result and an economically meaningful result.
6. Explain and interpret the p-value as it relates to hypothesis testing.
7. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning the population mean of both large and small samples when the population is normally or approximately normally distributed and the variance is 1) known or 2) unknown.



Overview of LOS

Hypothesis Testing

8. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning the equality of the population means of two at least approximately normally distributed populations, based on independent random samples with 1) equal or 2) unequal assumed variances.

9. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning the mean difference of two normally distributed populations.

10. Identify the appropriate test statistic and interpret the results for a hypothesis test concerning 1) the variance of a normally distributed population, and 2) the equality of the variances of two normally distributed populations based on two independent random samples.

11. Distinguish between parametric and nonparametric tests and describe situations in which the use of nonparametric tests may be appropriate.



Overview of LOS

Technical Analysis

1. Explain principles of technical analysis, its applications, and its underlying assumptions.
2. Describe the construction of different types of technical analysis charts and interpret them.
3. Explain uses of trend, support, resistance lines, and change in polarity.
4. Describe common chart patterns.
5. Describe common technical analysis indicators (price-based, momentum oscillators, sentiment, and flow of funds).
6. Explain how technical analysts use cycles.
7. Describe the key tenets of Elliott Wave Theory and the importance of Fibonacci numbers.
8. Describe intermarket analysis as it relates to technical analysis and asset allocation.

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Thank You!

