Quantitative Methods

LEARNING OUTCOMES

The Time Value of Money

The candidate should be able to:

- □ interpret interest rates as required rates of return, discount rates, or opportunity costs
- □ explain an interest rate as the sum of a real risk-free rate and premiums that compensate investors for bearing distinct types of risk
- □ 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
- □ demonstrate the use of a time line in modeling and solving time value of money problems
- □ calculate the solution for time value of money problems with different frequencies of compounding
- □ calculate and interpret the effective annual rate, given the stated annual interest rate and the frequency of compounding

Organizing, Visualizing, and Describing Data

The candidate should be able to:

- □ identify and compare data types
- □ describe how data are organized for quantitative analysis
- □ interpret frequency and related distributions
- □ interpret a contingency table
- □ describe ways that data may be visualized and evaluate uses of specific visualizations

- □ describe how to select among visualization types
- □ calculate and interpret measures of central tendency
- □ evaluate alternative definitions of mean to address an investment problem
- □ calculate quantiles and interpret related visualizations
- □ calculate and interpret measures of dispersion
- □ calculate and interpret target downside deviation
- □ interpret skewness
- □ interpret kurtosis
- □ interpret correlation between two variables

Probability Concepts

The candidate should be able to:

- □ define a random variable, an outcome, and an event
- □ identify the two defining properties of probability, including mutually exclusive and exhaustive events, and compare and contrast empirical, subjective, and a priori probabilities
- □ describe the probability of an event in terms of odds for and against the event
- □ calculate and interpret conditional probabilities
- □ demonstrate the application of the multiplication and addition rules for probability
- □ compare and contrast dependent and independent events
- □ calculate and interpret an unconditional probability using the total probability rule
- □ calculate and interpret the expected value, variance, and standard deviation of random variables
- □ explain the use of conditional expectation in investment applications
- □ interpret a probability tree and demonstrate its application to investment problems
- □ calculate and interpret the expected value, variance, standard deviation, covariances, and correlations of portfolio returns
- □ calculate and interpret the covariances of portfolio returns using the joint probability function
- □ calculate and interpret an updated probability using Bayes' formula
- □ identify the most appropriate method to solve a particular counting problem and analyze counting problems using factorial, combination, and permutation concepts

Common Probability Distributions

The candidate should be able to:

- □ define a probability distribution and compare and contrast discrete and continuous random variables and their probability functions
- □ calculate and interpret probabilities for a random variable given its cumulative distribution function
- □ describe the properties of a discrete uniform random variable, and calculate and interpret probabilities given the discrete uniform distribution function
- □ describe the properties of the continuous uniform distribution, and calculate and interpret probabilities given a continuous uniform distribution
- □ describe the properties of a Bernoulli random variable and a binomial random variable, and calculate and interpret probabilities given the binomial distribution function
- □ explain the key properties of the normal distribution
- □ contrast a multivariate distribution and a univariate distribution, and explain the role of correlation in the multivariate normal distribution

- ☐ calculate the probability that a normally distributed random variable lies inside a given interval
- ☐ explain how to standardize a random variable
- ☐ calculate and interpret probabilities using the standard normal distribution
- ☐ define shortfall risk, calculate the safety-first ratio, and identify an optimal portfolio using Roy's safety-first criterion
- ☐ explain the relationship between normal and lognormal distributions and why the lognormal distribution is used to model asset prices
- ☐ calculate and interpret a continuously compounded rate of return, given a specific holding period return
- ☐ describe the properties of the Student's *t*-distribution, and calculate and interpret its degrees of freedom
- ☐ describe the properties of the chi-square distribution and the *F*-distribution, and calculate and interpret their degrees of freedom
- ☐ describe Monte Carlo simulation

Sampling and Estimation

The candidate should be able to:

- ☐ compare and contrast probability samples with non-probability samples and discuss applications of each to an investment problem
- ☐ explain sampling error
- ☐ compare and contrast simple random, stratified random, cluster, convenience, and judgmental sampling
- ☐ explain the central limit theorem and its importance
- ☐ calculate and interpret the standard error of the sample mean
- ☐ identify and describe desirable properties of an estimator
- ☐ contrast a point estimate and a confidence interval estimate of a population parameter
- ☐ calculate and interpret a confidence interval for a population mean, given a normal distribution with 1) a known population variance, 2) an unknown population variance, or 3) an unknown population variance and a large sample size
- ☐ describe the use of resampling (bootstrap, jackknife) to estimate the sampling distribution of a statistic
- ☐ describe the issues regarding selection of the appropriate sample size, data snooping bias, sample selection bias, survivorship bias, look-ahead bias, and time-period bias

Hypothesis Testing

The candidate should be able to:

- ☐ define a hypothesis, describe the steps of hypothesis testing, and describe and interpret the choice of the null and alternative hypotheses
- ☐ compare and contrast one-tailed and two-tailed tests of hypotheses
- ☐ explain a test statistic, Type I and Type II errors, a significance level, how significance levels are used in hypothesis testing, and the power of a test
- ☐ explain a decision rule and the relation between confidence intervals and hypothesis tests, and determine whether a statistically significant result is also economically meaningful
- ☐ explain and interpret the *p*-value as it relates to hypothesis testing
- ☐ describe how to interpret the significance of a test in the context of multiple tests

- ☐ 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
- ☐ 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 equal assumed variances
- ☐ identify the appropriate test statistic and interpret the results for a hypothesis test concerning the mean difference of two normally distributed populations
- ☐ 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
- ☐ compare and contrast parametric and nonparametric tests, and describe situations where each is the more appropriate type of test
- ☐ explain parametric and nonparametric tests of the hypothesis that the population correlation coefficient equals zero, and determine whether the hypothesis is rejected at a given level of significance
- ☐ explain tests of independence based on contingency table data

Introduction to Linear Regression

The candidate should be able to:

- ☐ describe a simple linear regression model and the roles of the dependent and independent variables in the model
- ☐ describe the least squares criterion, how it is used to estimate regression coefficients, and their interpretation
- ☐ explain the assumptions underlying the simple linear regression model, and describe how residuals and residual plots indicate if these assumptions may have been violated
- ☐ calculate and interpret the coefficient of determination and the *F*-statistic in a simple linear regression
- ☐ describe the use of analysis of variance (ANOVA) in regression analysis, interpret ANOVA results, and calculate and interpret the standard error of estimate in a simple linear regression
- ☐ formulate a null and an alternative hypothesis about a population value of a regression coefficient, and determine whether the null hypothesis is rejected at a given level of significance
- ☐ calculate and interpret the predicted value for the dependent variable, and a prediction interval for it, given an estimated linear regression model and a value for the independent variable
- ☐ describe different functional forms of simple linear regressions

Economics

LEARNING OUTCOMES

Topics in Demand and Supply Analysis

The candidate should be able to:

- □ calculate and interpret price, income, and cross-price elasticities of demand and describe factors that affect each measure
- □ compare substitution and income effects
- □ contrast normal goods with inferior goods
- □ describe the phenomenon of diminishing marginal returns
- □ determine and interpret breakeven and shutdown points of production
- □ describe how economies of scale and diseconomies of scale affect costs

The Firm and Market Structures

The candidate should be able to:

- □ describe characteristics of perfect competition, monopolistic competition, oligopoly, and pure monopoly
- □ explain relationships between price, marginal revenue, marginal cost, economic profit, and the elasticity of demand under each market structure
- □ describe a firm's supply function under each market structure
- □ describe and determine the optimal price and output for firms under each market structure
- □ describe pricing strategy under each market structure
- □ explain factors affecting long-run equilibrium under each market structure
- □ describe the use and limitations of concentration measures in identifying market structure
- □ identify the type of market structure within which a firm operates

Aggregate Output, Prices, and Economic Growth

The candidate should be able to:

- □ explain how the aggregate demand curve is generated
- □ explain the aggregate supply curve in the short run and long run
- □ explain causes of movements along and shifts in aggregate demand and supply curves
- □ describe how fluctuations in aggregate demand and aggregate supply cause short-run changes in the economy and the business cycle
- □ distinguish among the following types of macroeconomic equilibria: long-run full employment, short-run recessionary gap, short-run inflationary gap, and short-run stagflation
- □ explain how a short-run macroeconomic equilibrium may occur at a level above or below full employment
- □ analyze the effect of combined changes in aggregate supply and demand on the economy
- □ describe sources, measurement, and sustainability of economic growth
- □ describe the production function approach to analyzing the sources of economic growth
- □ define and contrast input growth with growth of total factor productivity as components of economic growth
- □ calculate and explain gross domestic product (GDP) using expenditure and income approaches
- □ compare the sum-of-value-added and value-of-final-output methods of calculating GDP
- □ compare nominal and real GDP and calculate and interpret the GDP deflator
- □ compare GDP, national income, personal income, and personal disposable income
- □ explain the fundamental relationship among saving, investment, the fiscal balance, and the trade balance

Understanding Business Cycles

The candidate should be able to:

- □ describe the business cycle and its phases
- □ describe credit cycles
- □ describe how resource use, consumer and business activity, housing sector activity, and external trade sector activity vary as an economy moves through the business cycle
- □ describe theories of the business cycle
- □ interpret a set of economic indicators, and describe their uses and limitations
- □ describe types of unemployment, and compare measures of unemployment
- □ explain inflation, hyperinflation, disinflation, and deflation
- □ explain the construction of indexes used to measure inflation
- □ compare inflation measures, including their uses and limitations
- □ contrast cost-push and demand-pull inflation

Monetary and Fiscal Policy

The candidate should be able to:

- □ compare monetary and fiscal policy
- □ describe functions and definitions of money
- □ explain the money creation process
- □ describe theories of the demand for and supply of money

- describe the Fisher effect
- describe roles and objectives of central banks
- contrast the costs of expected and unexpected inflation
- describe tools used to implement monetary policy
- describe the monetary transmission mechanism
- explain the relationships between monetary policy and economic growth, inflation, interest, and exchange rates
- describe qualities of effective central banks
- contrast the use of inflation, interest rate, and exchange rate targeting by central banks
- determine whether a monetary policy is expansionary or contractionary
- describe limitations of monetary policy
- describe roles and objectives of fiscal policy
- describe the arguments about whether the size of a national debt relative to GDP matters
- describe tools of fiscal policy, including their advantages and disadvantages
- explain the implementation of fiscal policy and difficulties of implementation
- determine whether a fiscal policy is expansionary or contractionary
- explain the interaction of monetary and fiscal policy

Geopolitics

The candidate should be able to:

- describe geopolitics from a cooperation versus competition perspective
- describe geopolitics and its relationship with globalization
- describe tools of geopolitics and their impact on regions and economies
- describe geopolitical risk and its impact on investments

International Trade and Capital Flows

The candidate should be able to:

- compare gross domestic product and gross national product
- describe benefits and costs of international trade
- contrast comparative advantage and absolute advantage
- compare the Ricardian and Heckscher–Ohlin models of trade and the source(s) of comparative advantage in each model
- compare types of trade and capital restrictions and their economic implications
- explain motivations for and advantages of trading blocs, common markets, and economic unions
- describe common objectives of capital restrictions imposed by governments
- describe the balance of payments accounts including their components
- explain how decisions by consumers, firms, and governments affect the balance of payments
- describe functions and objectives of the international organizations that facilitate trade, including the World Bank, the International Monetary Fund, and the World Trade Organization

Currency Exchange Rates

The candidate should be able to:

- define an exchange rate and distinguish between nominal and real exchange rates and spot and forward exchange rates
- calculate and interpret the percentage change in a currency relative to another currency

- ◻ describe functions of and participants in the foreign exchange market
- ◻ calculate and interpret currency cross-rates
- ◻ calculate an outright forward quotation from forward quotations expressed on a points basis or in percentage terms
- ◻ explain the arbitrage relationship between spot rates, forward rates, and interest rates
- ◻ calculate and interpret a forward discount or premium
- ◻ calculate and interpret the forward rate consistent with the spot rate and the interest rate in each currency
- ◻ describe exchange rate regimes
- ◻ explain the effects of exchange rates on countries' international trade and capital flows

Financial Statement Analysis

LEARNING OUTCOMES

Introduction to Financial Statement Analysis

The candidate should be able to:

- □ describe the roles of financial reporting and financial statement analysis
- □ describe the roles of the statement of financial position, statement of comprehensive income, statement of changes in equity, and statement of cash flows in evaluating a company's performance and financial position
- □ describe the importance of financial statement notes and supplementary information—including disclosures of accounting policies, methods, and estimates—and management's commentary
- □ describe the objective of audits of financial statements, the types of audit reports, and the importance of effective internal controls
- □ identify and describe information sources that analysts use in financial statement analysis besides annual financial statements and supplementary information
- □ describe the steps in the financial statement analysis framework

Financial Reporting Standards

The candidate should be able to:

- □ describe the objective of financial reporting and the importance of financial reporting standards in security analysis and valuation
- □ describe the roles of financial reporting standard-setting bodies and regulatory authorities in establishing and enforcing reporting standards
- □ describe the International Accounting Standards Board's conceptual framework, including qualitative characteristics of financial reports, constraints on financial reports, and required reporting elements

- ☐ describe general requirements for financial statements under International Financial Reporting Standards (IFRS)
- ☐ describe implications for financial analysis of alternative financial reporting systems and the importance of monitoring developments in financial reporting standards

Understanding Income Statements

The candidate should be able to:

- ☐ describe the components of the income statement and alternative presentation formats of that statement
- ☐ describe general principles of revenue recognition and accounting standards for revenue recognition
- ☐ calculate revenue given information that might influence the choice of revenue recognition method
- ☐ describe general principles of expense recognition, specific expense recognition applications, and implications of expense recognition choices for financial analysis
- ☐ describe the financial reporting treatment and analysis of non-recurring items (including discontinued operations, unusual or infrequent items) and changes in accounting policies
- ☐ contrast operating and non-operating components of the income statement
- ☐ describe how earnings per share is calculated and calculate and interpret a company's earnings per share (both basic and diluted earnings per share) for both simple and complex capital structures
- ☐ contrast dilutive and antidilutive securities and describe the implications of each for the earnings per share calculation
- ☐ formulate income statements into common-size income statements
- ☐ evaluate a company's financial performance using common-size income statements and financial ratios based on the income statement
- ☐ describe, calculate, and interpret comprehensive income
- ☐ describe other comprehensive income and identify major types of items included in it

Understanding Balance Sheets

The candidate should be able to:

- ☐ describe the elements of the balance sheet: assets, liabilities, and equity
- ☐ describe uses and limitations of the balance sheet in financial analysis
- ☐ describe alternative formats of balance sheet presentation
- ☐ contrast current and non-current assets and current and non-current liabilities
- ☐ describe different types of assets and liabilities and the measurement bases of each
- ☐ describe the components of shareholders' equity
- ☐ demonstrate the conversion of balance sheets to common-size balance sheets and interpret common-size balance sheets
- ☐ calculate and interpret liquidity and solvency ratios

Understanding Cash Flow Statements

The candidate should be able to:

- ☐ compare cash flows from operating, investing, and financing activities and classify cash flow items as relating to one of those three categories given a description of the items
- ☐ describe how non-cash investing and financing activities are reported

- □ contrast cash flow statements prepared under International Financial Reporting Standards (IFRS) and US generally accepted accounting principles (US GAAP)
- □ compare and contrast the direct and indirect methods of presenting cash from operating activities and describe arguments in favor of each method
- □ describe how the cash flow statement is linked to the income statement and the balance sheet
- □ describe the steps in the preparation of direct and indirect cash flow statements, including how cash flows can be computed using income statement and balance sheet data
- □ demonstrate the conversion of cash flows from the indirect to direct method
- □ analyze and interpret both reported and common-size cash flow statements
- □ calculate and interpret free cash flow to the firm, free cash flow to equity, and performance and coverage cash flow ratios

Financial Analysis Techniques

The candidate should be able to:

- □ describe tools and techniques used in financial analysis, including their uses and limitations
- □ identify, calculate, and interpret activity, liquidity, solvency, profitability, and valuation ratios
- □ describe relationships among ratios and evaluate a company using ratio analysis
- □ demonstrate the application of DuPont analysis of return on equity and calculate and interpret effects of changes in its components
- □ calculate and interpret ratios used in equity analysis and credit analysis
- □ explain the requirements for segment reporting and calculate and interpret segment ratios
- □ describe how ratio analysis and other techniques can be used to model and forecast earnings

Inventories

The candidate should be able to:

- □ contrast costs included in inventories and costs recognised as expenses in the period in which they are incurred
- □ describe different inventory valuation methods (cost formulas)
- □ calculate and compare cost of sales, gross profit, and ending inventory using different inventory valuation methods and using perpetual and periodic inventory systems
- □ calculate and explain how inflation and deflation of inventory costs affect the financial statements and ratios of companies that use different inventory valuation methods
- □ explain LIFO reserve and LIFO liquidation and their effects on financial statements and ratios
- □ demonstrate the conversion of a company's reported financial statements from LIFO to FIFO for purposes of comparison
- □ describe the measurement of inventory at the lower of cost and net realisable value
- □ describe implications of valuing inventory at net realisable value for financial statements and ratios
- □ describe the financial statement presentation of and disclosures relating to inventories
- □ explain issues that analysts should consider when examining a company's inventory disclosures and other sources of information

- ◻ calculate and compare ratios of companies, including companies that use different inventory methods
- ◻ analyze and compare the financial statements of companies, including companies that use different inventory methods

Long-Lived Assets

The candidate should be able to:

- ◻ compare the financial reporting of the following types of intangible assets: purchased, internally developed, acquired in a business combination
- ◻ explain and evaluate how capitalising versus expensing costs in the period in which they are incurred affects financial statements and ratios
- ◻ describe the different depreciation methods for property, plant, and equipment and calculate depreciation expense
- ◻ describe how the choice of depreciation method and assumptions concerning useful life and residual value affect depreciation expense, financial statements, and ratios
- ◻ explain and evaluate how impairment, revaluation, and derecognition of property, plant, and equipment and intangible assets affect financial statements and ratios
- ◻ describe the different amortisation methods for intangible assets with finite lives and calculate amortisation expense
- ◻ describe how the choice of amortisation method and assumptions concerning useful life and residual value affect amortisation expense, financial statements, and ratios
- ◻ describe the revaluation model
- ◻ explain the impairment of property, plant, and equipment and intangible assets
- ◻ explain the derecognition of property, plant, and equipment and intangible assets
- ◻ describe the financial statement presentation of and disclosures relating to property, plant, and equipment and intangible assets
- ◻ analyze and interpret financial statement disclosures regarding property, plant, and equipment and intangible assets
- ◻ compare the financial reporting of investment property with that of property, plant, and equipment
- ◻ identify and contrast costs that are capitalised and costs that are expensed in the period in which they are incurred

Income Taxes

The candidate should be able to:

- ◻ describe the differences between accounting profit and taxable income and define key terms, including deferred tax assets, deferred tax liabilities, valuation allowance, taxes payable, and income tax expense
- ◻ explain how deferred tax liabilities and assets are created and the factors that determine how a company's deferred tax liabilities and assets should be treated for the purposes of financial analysis
- ◻ calculate income tax expense, income taxes payable, deferred tax assets, and deferred tax liabilities, and calculate and interpret the adjustment to the financial statements related to a change in the income tax rate
- ◻ calculate the tax base of a company's assets and liabilities
- ◻ evaluate the effect of tax rate changes on a company's financial statements and ratios
- ◻ identify and contrast temporary versus permanent differences in pre-tax accounting income and taxable income

- □ explain recognition and measurement of current and deferred tax items
- □ describe the valuation allowance for deferred tax assets—when it is required and what effect it has on financial statements
- □ analyze disclosures relating to deferred tax items and the effective tax rate reconciliation and explain how information included in these disclosures affects a company's financial statements and financial ratios
- □ identify the key provisions of and differences between income tax accounting under International Financial Reporting Standards (IFRS) and US generally accepted accounting principles (GAAP)

Non-Current (Long-Term) Liabilities

The candidate should be able to:

- □ determine the initial recognition, initial measurement and subsequent measurement of bonds
- □ describe the effective interest method and calculate interest expense, amortisation of bond discounts/premiums, and interest payments
- □ explain the derecognition of debt
- □ describe the role of debt covenants in protecting creditors
- □ describe the financial statement presentation of and disclosures relating to debt
- □ explain motivations for leasing assets instead of purchasing them
- □ explain the financial reporting of leases from a lessee's perspective
- □ explain the financial reporting of leases from a lessor's perspective
- □ compare the presentation and disclosure of defined contribution and defined benefit pension plans
- □ calculate and interpret leverage and coverage ratios

Financial Reporting Quality

The candidate should be able to:

- □ compare and contrast financial reporting quality with the quality of reported results (including quality of earnings, cash flow, and balance sheet items)
- □ describe a spectrum for assessing financial reporting quality
- □ explain the difference between conservative and aggressive accounting
- □ describe motivations that might cause management to issue financial reports that are not high quality
- □ describe conditions that are conducive to issuing low-quality, or even fraudulent, financial reports
- □ describe mechanisms that discipline financial reporting quality and the potential limitations of those mechanisms
- □ describe presentation choices, including non-GAAP measures, that could be used to influence an analyst's opinion
- □ describe accounting methods (choices and estimates) that could be used to manage earnings, cash flow, and balance sheet items
- □ describe accounting warning signs and methods for detecting manipulation of information in financial reports

Applications of Financial Statement Analysis

The candidate should be able to:

- □ evaluate a company's past financial performance and explain how a company's strategy is reflected in past financial performance
- □ demonstrate how to forecast a company's future net income and cash flow
- □ describe the role of financial statement analysis in assessing the credit quality of a potential debt investment

- □ describe the use of financial statement analysis in screening for potential equity investments
- □ explain appropriate analyst adjustments to a company's financial statements to facilitate comparison with another company

Corporate Issuers

LEARNING OUTCOMES

Corporate Structures and Ownership

The candidate should be able to:

- □ compare business structures and describe key features of corporate issuers
- □ compare public and private companies
- □ compare the financial claims and motivations of lenders and owners

Introduction to Corporate Governance and Other ESG Considerations

The candidate should be able to:

- □ describe a company's stakeholder groups and compare their interests
- □ describe the principal-agent relationship and conflicts that may arise between stakeholder groups
- □ describe corporate governance and mechanisms to manage stakeholder relationships and mitigate associated risks
- □ describe both the potential risks of poor corporate governance and stakeholder management and the benefits from effective corporate governance and stakeholder management
- □ describe environmental, social, and governance considerations in investment analysis
- □ describe environmental, social, and governance investment approaches

Business Models & Risks

The candidate should be able to:

- □ Describe key features and types of business models.

- □ Describe expected relations between a company's external environment, business model, and financing needs.
- □ Explain and classify types of business and financial risks for a company.

Capital Investments

The candidate should be able to:

- □ describe types of capital investments made by companies
- □ describe the capital allocation process and basic principles of capital allocation
- □ demonstrate the use of net present value (NPV) and internal rate of return (IRR) in allocating capital and describe the advantages and disadvantages of each method
- □ describe common capital allocation pitfalls
- □ describe expected relations among a company's investments, company value, and share price
- □ describe types of real options relevant to capital investment

Working Capital & Liquidity

The candidate should be able to:

- □ compare methods to finance working capital
- □ explain expected relations between working capital, liquidity, and short-term funding needs (NEW)
- □ describe sources of primary and secondary liquidity and factors affecting a company's liquidity position
- □ compare a company's liquidity position with that of peers
- □ evaluate short-term funding choices available to a company

Cost of Capital-Foundational Topics

The candidate should be able to:

- □ calculate and interpret the weighted average cost of capital (WACC) of a company
- □ describe how taxes affect the cost of capital from different capital sources
- □ calculate and interpret the cost of debt capital using the yield-to-maturity approach and the debt-rating approach
- □ calculate and interpret the cost of noncallable, nonconvertible preferred stock
- □ calculate and interpret the cost of equity capital using the capital asset pricing model approach and the bond yield plus risk premium approach
- □ explain and demonstrate beta estimation for public companies, thinly traded public companies, and nonpublic companies
- □ explain and demonstrate the correct treatment of flotation costs

Capital Structure

The candidate should be able to:

- □ explain factors affecting capital structure
- □ describe how a company's capital structure may change over its life cycle
- □ explain the Modigliani–Miller propositions regarding capital structure
- □ describe the use of target capital structure in estimating WACC, and calculate and interpret target capital structure weights
- □ describe competing stakeholder interests in capital structure decisions

Measures of Leverage

The candidate should be able to:

- □ define and explain leverage, business risk, sales risk, operating risk, and financial risk and classify a risk
- □ calculate and interpret the degree of operating leverage, the degree of financial leverage, and the degree of total leverage
- □ analyze the effect of financial leverage on a company’s net income and return on equity
- □ calculate the breakeven quantity of sales and determine the company's net income at various sales levels
- □ calculate and interpret the operating breakeven quantity of sales

Equity Investments

LEARNING OUTCOMES

Market Organization and Structure

The candidate should be able to:

- ◻ explain the main functions of the financial system
- ◻ describe classifications of assets and markets
- ◻ describe the major types of securities, currencies, contracts, commodities, and real assets that trade in organized markets, including their distinguishing characteristics and major subtypes
- ◻ describe types of financial intermediaries and services that they provide
- ◻ compare positions an investor can take in an asset
- ◻ calculate and interpret the leverage ratio, the rate of return on a margin transaction, and the security price at which the investor would receive a margin call
- ◻ compare execution, validity, and clearing instructions
- ◻ compare market orders with limit orders
- ◻ define primary and secondary markets and explain how secondary markets support primary markets
- ◻ describe how securities, contracts, and currencies are traded in quote-driven, order-driven, and brokered markets
- ◻ describe characteristics of a well-functioning financial system
- ◻ describe objectives of market regulation

Security Market Indexes

The candidate should be able to:

- ◻ describe a security market index

- □ calculate and interpret the value, price return, and total return of an index
- □ describe the choices and issues in index construction and management
- □ compare the different weighting methods used in index construction
- □ calculate and analyze the value and return of an index given its weighting method
- □ describe rebalancing and reconstitution of an index
- □ describe uses of security market indexes
- □ describe types of equity indexes
- □ compare types of security market indexes
- □ describe types of fixed-income indexes
- □ describe indexes representing alternative investments

Market Efficiency

The candidate should be able to:

- □ describe market efficiency and related concepts, including their importance to investment practitioners
- □ contrast market value and intrinsic value
- □ explain factors that affect a market's efficiency
- □ contrast weak-form, semi-strong-form, and strong-form market efficiency
- □ explain the implications of each form of market efficiency for fundamental analysis, technical analysis, and the choice between active and passive portfolio management
- □ describe market anomalies
- □ describe behavioral finance and its potential relevance to understanding market anomalies

Overview of Equity Securities

The candidate should be able to:

- □ describe characteristics of types of equity securities
- □ describe differences in voting rights and other ownership characteristics among different equity classes
- □ compare and contrast public and private equity securities
- □ describe methods for investing in non-domestic equity securities
- □ compare the risk and return characteristics of different types of equity securities
- □ explain the role of equity securities in the financing of a company's assets
- □ contrast the market value and book value of equity securities
- □ compare a company's cost of equity, its (accounting) return on equity, and investors' required rates of return

Introduction to Industry and Company Analysis

The candidate should be able to:

- □ explain uses of industry analysis and the relation of industry analysis to company analysis
- □ compare methods by which companies can be grouped
- □ explain the factors that affect the sensitivity of a company to the business cycle and the uses and limitations of industry and company descriptors such as "growth," "defensive," and "cyclical"
- □ describe current industry classification systems, and identify how a company should be classified, given a description of its activities and the classification system
- □ explain how a company's industry classification can be used to identify a potential "peer group" for equity valuation

- describe the elements that need to be covered in a thorough industry analysis
- describe the principles of strategic analysis of an industry
- explain the effects of barriers to entry, industry concentration, industry capacity, and market share stability on pricing power and price competition
- describe industry life-cycle models, classify an industry as to life-cycle stage, and describe limitations of the life-cycle concept in forecasting industry performance
- describe macroeconomic, technological, demographic, governmental, social, and environmental influences on industry growth, profitability, and risk
- compare characteristics of representative industries from the various economic sectors
- describe the elements that should be covered in a thorough company analysis

Equity Valuation: Concepts and Basic Tools

The candidate should be able to:

- evaluate whether a security, given its current market price and a value estimate, is overvalued, fairly valued, or undervalued by the market
- describe major categories of equity valuation models
- describe regular cash dividends, extra dividends, stock dividends, stock splits, reverse stock splits, and share repurchases
- describe dividend payment chronology
- explain the rationale for using present value models to value equity and describe the dividend discount and free-cash-flow-to-equity models
- explain advantages and disadvantages of each category of valuation model
- calculate the intrinsic value of a non-callable, non-convertible preferred stock
- calculate and interpret the intrinsic value of an equity security based on the Gordon (constant) growth dividend discount model or a two-stage dividend discount model, as appropriate
- identify characteristics of companies for which the constant growth or a multistage dividend discount model is appropriate
- explain the rationale for using price multiples to value equity, how the price to earnings multiple relates to fundamentals, and the use of multiples based on comparables
- calculate and interpret the following multiples: price to earnings, price to an estimate of operating cash flow, price to sales, and price to book value
- describe enterprise value multiples and their use in estimating equity value
- describe asset-based valuation models and their use in estimating equity value

Fixed Income

LEARNING OUTCOMES

Fixed-Income Securities: Defining Elements

The candidate should be able to:

- □ describe basic features of a fixed-income security
- □ describe content of a bond indenture
- □ compare affirmative and negative covenants and identify examples of each
- □ describe how legal, regulatory, and tax considerations affect the issuance and trading of fixed-income securities
- □ describe how cash flows of fixed-income securities are structured
- □ describe contingency provisions affecting the timing and/or nature of cash flows of fixed-income securities and whether such provisions benefit the borrower or the lender

Fixed-Income Markets: Issuance, Trading, and Funding

The candidate should be able to:

- □ describe classifications of global fixed-income markets
- □ describe the use of interbank offered rates as reference rates in floating-rate debt
- □ describe mechanisms available for issuing bonds in primary markets
- □ describe secondary markets for bonds
- □ describe securities issued by sovereign governments
- □ describe securities issued by non-sovereign governments, quasi-government entities, and supranational agencies
- □ describe types of debt issued by corporations
- □ describe structured financial instruments
- □ describe short-term funding alternatives available to banks

- ☐ describe repurchase agreements (repos) and the risks associated with them

Introduction to Fixed-Income Valuation

The candidate should be able to:

- ☐ calculate a bond's price given a market discount rate
- ☐ identify the relationships among a bond's price, coupon rate, maturity, and market discount rate (yield-to-maturity)
- ☐ define spot rates and calculate the price of a bond using spot rates
- ☐ describe and calculate the flat price, accrued interest, and the full price of a bond
- ☐ describe matrix pricing
- ☐ calculate annual yield on a bond for varying compounding periods in a year
- ☐ calculate and interpret yield measures for fixed-rate bonds and floating-rate notes
- ☐ calculate and interpret yield measures for money market instruments
- ☐ define and compare the spot curve, yield curve on coupon bonds, par curve, and forward curve
- ☐ define forward rates and calculate spot rates from forward rates, forward rates from spot rates, and the price of a bond using forward rates
- ☐ compare, calculate, and interpret yield spread measures

Introduction to Asset-Backed Securities

The candidate should be able to:

- ☐ explain benefits of securitization for economies and financial markets
- ☐ describe securitization, including the parties involved in the process and the roles they play
- ☐ describe typical structures of securitizations, including credit tranching and time tranching
- ☐ describe types and characteristics of residential mortgage loans that are typically securitized
- ☐ describe types and characteristics of residential mortgage-backed securities, including mortgage pass-through securities and collateralized mortgage obligations, and explain the cash flows and risks for each type
- ☐ define prepayment risk and describe the prepayment risk of mortgage-backed securities
- ☐ describe characteristics and risks of commercial mortgage-backed securities
- ☐ describe types and characteristics of non-mortgage asset-backed securities, including the cash flows and risks of each type
- ☐ describe collateralized debt obligations, including their cash flows and risks
- ☐ describe characteristics and risks of covered bonds and how they differ from other asset-backed securities

Understanding Fixed-Income Risk and Return

The candidate should be able to:

- ☐ calculate and interpret the sources of return from investing in a fixed-rate bond
- ☐ define, calculate, and interpret Macaulay, modified, and effective durations
- ☐ explain why effective duration is the most appropriate measure of interest rate risk for bonds with embedded options
- ☐ define key rate duration and describe the use of key rate durations in measuring the sensitivity of bonds to changes in the shape of the benchmark yield curve
- ☐ explain how a bond's maturity, coupon, and yield level affect its interest rate risk
- ☐ calculate the duration of a portfolio and explain the limitations of portfolio duration

- □ calculate and interpret the money duration of a bond and price value of a basis point (PVBP)
- □ calculate and interpret approximate convexity and compare approximate and effective convexity
- □ calculate the percentage price change of a bond for a specified change in yield, given the bond's approximate duration and convexity
- □ describe how the term structure of yield volatility affects the interest rate risk of a bond
- □ describe the relationships among a bond's holding period return, its duration, and the investment horizon
- □ explain how changes in credit spread and liquidity affect yield-to-maturity of a bond and how duration and convexity can be used to estimate the price effect of the changes
- □ describe the difference between empirical duration and analytical duration

Fundamentals of Credit Analysis

The candidate should be able to:

- □ describe credit risk and credit-related risks affecting corporate bonds
- □ describe default probability and loss severity as components of credit risk
- □ describe seniority rankings of corporate debt and explain the potential violation of the priority of claims in a bankruptcy proceeding
- □ compare and contrast corporate issuer credit ratings and issue credit ratings and describe the rating agency practice of "notching"
- □ explain risks in relying on ratings from credit rating agencies
- □ explain the four Cs (Capacity, Collateral, Covenants, and Character) of traditional credit analysis
- □ calculate and interpret financial ratios used in credit analysis
- □ evaluate the credit quality of a corporate bond issuer and a bond of that issuer, given key financial ratios of the issuer and the industry
- □ describe macroeconomic, market, and issuer-specific factors that influence the level and volatility of yield spreads
- □ explain special considerations when evaluating the credit of high-yield, sovereign, and non-sovereign government debt issuers and issues

Derivatives

LEARNING OUTCOMES

Derivative Instrument and Derivative Market Features

The candidate should be able to:

- □ define a derivative and describe basic features of a derivative instrument
- □ describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets

Forward Commitment and Contingent Claim Features and Instruments

The candidate should be able to:

- □ define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics
- □ determine the value at expiration and profit from a long or a short position in a call or put option
- □ contrast forward commitments with contingent claims

Derivative Benefits, Risks, and Issuer and Investor Uses

The candidate should be able to:

- □ describe benefits and risks of derivative instruments
- □ compare the use of derivatives among issuers and investors

Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives

The candidate should be able to:

- □ explain how the concepts of arbitrage and replication are used in pricing derivatives

□ explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset

Pricing and Valuation of Forward Contracts and for an Underlying with Varying Maturities

The candidate should be able to:

□ Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration
□ Explain how forward rates are determined for an underlying with a term structure and describe their uses

Pricing and Valuation of Futures Contracts

The candidate should be able to:

□ compare the value and price of forward and futures contracts
□ explain why forward and futures prices differ

Pricing and Valuation of Interest Rates and Other Swaps

The candidate should be able to:

□ describe how swap contracts are similar to but different from a series of forward contracts
□ contrast the value and price of swaps

Pricing and Valuation of Options

The candidate should be able to:

□ Explain the exercise value, moneyness, and time value of an option
□ Contrast the use of arbitrage and replication concepts in pricing forward commitments and contingent claims
□ Identify the factors that determine the value of an option and describe how each factor affects the value of an option

Option Replication Using Put–Call Parity

The candidate should be able to:

□ explain put–call parity for European options
□ explain put–call *forward* parity for European options

Valuing a Derivative Using a One-Period Binomial Model

The candidate should be able to:

□ explain how to value a derivative using a one-period binomial model
□ describe the concept of risk neutrality in derivatives pricing

Alternative Investments

LEARNING OUTCOMES

Categories, Characteristics, and Compensation Structures of Alternative Investments

The candidate should be able to:

- □ describe types and categories of alternative investments
- □ describe characteristics of direct investment, co-investment, and fund investment methods for alternative investments
- □ describe investment and compensation structures commonly used in alternative investments

Performance Calculation and Appraisal of Alternative Investments

The candidate should be able to:

- □ describe issues in performance appraisal of alternative investments
- □ calculate and interpret returns of alternative investments both before and after fees

Private Capital, Real Estate, Infrastructure, Natural Resources, and Hedge Funds

The candidate should be able to:

- □ explain investment characteristics of private equity
- □ explain investment characteristics of private debt
- □ explain investment characteristics of real estate
- □ explain investment characteristics of infrastructure
- □ explain investment characteristics of natural resources
- □ explain investment characteristics of hedge funds

Portfolio Management

LEARNING OUTCOMES

Portfolio Management: An Overview

The candidate should be able to:

- □ describe the portfolio approach to investing
- □ describe the steps in the portfolio management process
- □ describe types of investors and distinctive characteristics and needs of each
- □ describe defined contribution and defined benefit pension plans
- □ describe aspects of the asset management industry
- □ describe mutual funds and compare them with other pooled investment products

Portfolio Risk and Return: Part I

The candidate should be able to:

- □ calculate and interpret major return measures and describe their appropriate uses
- □ compare the money-weighted and time-weighted rates of return and evaluate the performance of portfolios based on these measures
- □ describe characteristics of the major asset classes that investors consider in forming portfolios
- □ explain risk aversion and its implications for portfolio selection
- □ explain the selection of an optimal portfolio, given an investor's utility (or risk aversion) and the capital allocation line
- □ calculate and interpret the mean, variance, and covariance (or correlation) of asset returns based on historical data
- □ calculate and interpret portfolio standard deviation

- □ describe the effect on a portfolio's risk of investing in assets that are less than perfectly correlated
- □ describe and interpret the minimum-variance and efficient frontiers of risky assets and the global minimum-variance portfolio

Portfolio Risk and Return: Part II

The candidate should be able to:

- □ describe the implications of combining a risk-free asset with a portfolio of risky assets
- □ explain the capital allocation line (CAL) and the capital market line (CML)
- □ explain systematic and nonsystematic risk, including why an investor should not expect to receive additional return for bearing nonsystematic risk
- □ explain return generating models (including the market model) and their uses
- □ calculate and interpret beta
- □ explain the capital asset pricing model (CAPM), including its assumptions, and the security market line (SML)
- □ calculate and interpret the expected return of an asset using the CAPM
- □ describe and demonstrate applications of the CAPM and the SML
- □ calculate and interpret the Sharpe ratio, Treynor ratio, M^2, and Jensen's alpha

Basics of Portfolio Planning and Construction

The candidate should be able to:

- □ describe the reasons for a written investment policy statement (IPS)
- □ describe the major components of an IPS
- □ describe risk and return objectives and how they may be developed for a client
- □ explain the difference between the willingness and the ability (capacity) to take risk in analyzing an investor's financial risk tolerance
- □ describe the investment constraints of liquidity, time horizon, tax concerns, legal and regulatory factors, and unique circumstances and their implications for the choice of portfolio assets
- □ explain the specification of asset classes in relation to asset allocation
- □ describe the principles of portfolio construction and the role of asset allocation in relation to the IPS
- □ describe how environmental, social, and governance (ESG) considerations may be integrated into portfolio planning and construction

The Behavioral Biases of Individuals

The candidate should be able to:

- □ compare and contrast cognitive errors and emotional biases
- □ discuss commonly recognized behavioral biases and their implications for financial decision making
- □ describe how behavioral biases of investors can lead to market characteristics that may not be explained by traditional finance

Introduction to Risk Management

The candidate should be able to:

- □ define risk management
- □ describe features of a risk management framework
- □ define risk governance and describe elements of effective risk governance
- □ explain how risk tolerance affects risk management
- □ describe risk budgeting and its role in risk governance

- □ identify financial and non-financial sources of risk and describe how they may interact
- □ describe methods for measuring and modifying risk exposures and factors to consider in choosing among the methods

Technical Analysis

The candidate should be able to:

- □ explain principles and assumptions of technical analysis
- □ describe potential links between technical analysis and behavioral finance
- □ compare principles of technical analysis and fundamental analysis
- □ describe and interpret different types of technical analysis charts
- □ explain uses of trend, support, and resistance lines
- □ explain common chart patterns
- □ explain common technical indicators
- □ describe principles of intermarket analysis
- □ explain technical analysis applications to portfolio management

Fintech in Investment Management

The candidate should be able to:

- □ describe "fintech"
- □ describe Big Data, artificial intelligence, and machine learning
- □ describe fintech applications to investment management
- □ describe financial applications of distributed ledger technology

Ethical and Professional Standards

LEARNING OUTCOMES

Ethics and Trust in the Investment Profession

The candidate should be able to:

- □ explain ethics
- □ describe the role of a code of ethics in defining a profession
- □ describe professions and how they establish trust
- □ describe the need for high ethical standards in investment management
- □ explain professionalism in investment management
- □ identify challenges to ethical behavior
- □ compare and contrast ethical standards with legal standards
- □ describe a framework for ethical decision making

Code of Ethics and Standards of Professional Conduct

The candidate should be able to:

- □ describe the structure of the CFA Institute Professional Conduct Program and the process for the enforcement of the Code and Standards
- □ identify the six components of the Code of Ethics and the seven Standards of Professional Conduct
- □ explain the ethical responsibilities required by the Code and Standards, including the sub-sections of each Standard

Guidance for Standards I–VII

The candidate should be able to:

- □ demonstrate the application of the Code of Ethics and Standards of Professional Conduct to situations involving issues of professional integrity
- □ recommend practices and procedures designed to prevent violations of the Code of Ethics and Standards of Professional Conduct
- □ identify conduct that conforms to the Code and Standards and conduct that violates the Code and Standards

Introduction to the Global Investment Performance Standards (GIPS)

The candidate should be able to:

- □ explain why the GIPS standards were created, who can claim compliance, and who benefits from compliance
- □ describe the key concepts of the GIPS Standards for Firms
- □ explain the purpose of composites in performance reporting
- □ describe the fundamentals of compliance, including the recommendations of the GIPS standards with respect to the definition of the firm and the firm's definition of discretion
- □ describe the concept of independent verification

Ethics Application

The candidate should be able to:

- □ evaluate practices, policies, and conduct relative to the CFA Institute Code of Ethics and Standards of Professional Conduct
- □ explain how the practices, policies, and conduct do or do not violate the CFA Institute Code of Ethics and Standards of Professional Conduct