finance applications & theory





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FINANCE: APPLICATIONS AND THEORY, FIFTH EDITION

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dedicated

to my parents, Tom and Sue—Marcia Millon Cornett to Kieran, the love of my life—Troy A. Adair Jr. to Anna, my wife and best friend—John Nofsinger



about the authors



Courtesy of Marcia Million Cornett

Marcia Millon Cornett Robert A. and Julia E. Dorn Professor of Finance at Bentley University. She received her BS degree in economics from Knox College in Galesburg, Illinois, and her MBA and PhD degrees in finance from Indiana University in Bloomington, Indiana. Dr. Cornett has written and published several articles in the areas of bank performance, bank regulation, corporate finance, and investments. Articles authored by Dr. Cornett have appeared in such academic journals as the Journal of Finance; the Journal of Money, Credit, and Banking; the Journal of Financial Economics; Financial Management; and the Journal of Banking and Finance. She was recently ranked the 124th most published out of more than 17,600 authors and the number five female author in finance literature over the last 50 years. Along with Anthony Saunders and Otgontsetseg Erhemjamts, Dr. Cornett has recently completed work on the tenth edition of Financial Institutions Management (McGraw-Hill Education) and the seventh edition of Financial Markets and Institutions (McGraw-Hill Education). Professor Cornett serves as an associate editor for the Journal of Banking and Finance, the Journal of Financial Services Research, Review of Financial Economics, Financial Review, and Multinational Finance Journal. Dr. Cornett has served as a member of the board of directors, the executive committee, and the finance committee of the SIU Credit Union. Dr. Cornett has also taught at Southern Illinois University at Carbondale, the University of Colorado, Boston College, and Southern Methodist University. She is a member of the Financial Management Association, the American Finance Association, and the Western Finance Association.



Courtesy of Tony Alton Adair Jr

Troy Alton Adair Jr. Visiting Professor at Lehigh University and Founder and CEO of dataDicts, Inc. He received his BS degree in computers/information science from the University of Alabama at Birmingham, his MBA from the University of North Dakota, and his PhD in finance from Indiana University. Dr. Adair is assisting Lehigh University in developing a FinTech program, and manages a data science consulting business specializing in providing customized data analytics assessments and training. He previously managed research computing infrastructure and support services for Harvard Business School and has written articles on bank regulator self-interest, analyst earnings per share forecasting, and capital budgeting in continuous time. He is the author of Corporate Finance Demystified, Excel Applications in Corporate Finance, and Excel Applications in Investments (all McGraw-Hill Education). He has also served as a consultant on financial data information systems and business intelligence to a number of international banks and insurance companies and as the faculty representative to the board of trustees investments committee at Alma College. Dr. Adair has also taught at the University of Michigan, Alma College, Hofstra University, Indiana University, and the University of North Carolina at Chapel Hill. He is a member of the Financial Management Association, the American Finance Association, and the Southern Finance Association.

John Nofsinger Professor and William H. Seward Endowed Chair of International Finance at the University of Alaska Anchorage. He earned his BS degree in electrical engineering from Washington State University, his MBA degree from Chapman University, and his PhD degree in finance from Washington State University. Dr. Nofsinger has written over 65 articles in the areas of investments, corporate finance, and behavioral finance. These papers have appeared in the scholarly journals Journal of Finance, Journal of Business, Journal of Financial and Quantitative Analysis, Financial Management, Journal of Corporate Finance, Journal of Banking and Finance, and Journal of Behavioral Decision Making, among others. Dr. Nofsinger has also authored (or coauthored) eleven trade books, scholarly books, and textbooks that have been translated into eleven different languages. The most prominent of these books is the industry book, The Psychology of Investing. Dr. Nofsinger is a leading expert in behavioral finance and is a frequent speaker on this topic at industry conferences, universities, and academic conferences. He is frequently quoted or appears in the financial media, including The Wall Street Journal, Financial Times, Fortune, Bloomberg Business Week, Smart Money, The Washington Post, and CNBC, and other media from The Dolans to The Street.com.



Courtesy of John Nofsinger



a note from the authors

"There is a lot to cover in this course so I focus on the core concepts, theories, and problems."

"I like to teach the course by using examples from their own individual lives." "My students come into this course with varying levels of math skills."

How many of these quotes might you have said while teaching the undergraduate corporate finance course? Our many years of teaching certainly reflect such sentiments, and, as we prepared to write this book, we conducted many market research studies that confirm just how much these statements—or ones similar—are common across the country. This critical course covers so many crucial topics that instructors need to focus on core ideas to ensure that students are getting the preparation they need for future classes—and for their lives beyond college.

We did not set out to write this book to change the way finance is taught, but rather to parallel and support the way that instructors from across the country currently teach finance. Well over 600 instructors teaching this course have shared their class experiences and ideas via a variety of research methods that we used to develop the framework for this text. We are excited to have authored a book that we think you will find fits your classroom style perfectly.

KEY THEMES

This book's framework emphasizes three themes. See the next section in this preface for a description of features in our book that support these themes.

- Finance is about connecting core concepts. We all struggle with fitting so many topics into this course, so this text strives to make it easier for you by getting back to the core concepts, key research, and current topics. We realize that today's students expect to learn more in class from lectures than in closely studying their textbooks, so we've created brief chapters that clearly lead students to crucial material that they need to review if they are to understand how to approach core financial concepts. The text is also organized around learning goals, making it easier for you to prep your course and for students to study the right topics.
- Finance can be taught using a personal perspective. Most long-term finance instructors have often heard students ask "How is this course relevant to me?" on the first day of class. We no longer teach classes dedicated solely to finance majors; many of us now must teach the first finance course to a mix of business majors. We need to give finance majors the rigor they need while not overwhelming class members from other majors. For years, instructors have used individual examples to help teach these concepts, but this is the first text to integrate this personal way of teaching into the chapters.
- Finance focuses on solving problems and decision making. This isn't to say that concepts and theories aren't important, but students will typically need to solve some kind of mathematical problem—or at least understand the impact of different



numerical scenarios—to make the right decision on common finance issues. If you, as an instructor, either assign problems for homework or create exams made up almost entirely of mathematical material, you understand the need for good problems (and plenty of them). You also understand from experience the number of office hours you spend tutoring students and grading homework. Students have different learning styles, and this text aims to address that challenge to allow you more time in class to get through the critical topics.

CHANGES IN THE FIFTH EDITION

The 2018 Tax Cuts and Jobs Act significantly impacts a firm's cost of capital, estimation of project cash flows, and more. As capital budgeting is an important part of this book, we have quickly incorporated the new environment into our theory and applications. In addition, we have updated every chapter. Below are the changes we made for this fifth edition, broken out by chapter.

Overall

- Simplified figures where appropriate and added captions to emphasize the main "takeaways"
- Updated data, company names, and scenarios to reflect latest available data and real-world changes
- Cross-referenced numbered examples with similar end-of-chapter problems and self-test problems so students can easily model their homework
- Updated the numbers in the end-of-chapter problems to provide variety and limit the transfer of answers from previous classes

Chapter 1: Introduction to Financial Management

- Updated the Personal Application with information on firms that have filed for bankruptcy more recently
- Changed Learning Goal 1-9 to address the new tax law change and its ramifications on businesses
- Updated the data in Example 1-2 on executive compensation
- Replaced Section 1.7 on the financial crisis with a new Section 1.7: Big Picture Environment, to discuss the ramifications of the Tax Cuts and Jobs Act of 2017

Chapter 2: Reviewing Financial Statements

- Added discussion of changes to recording of bonus depreciation under TCJA
- Added new TCJA corporate tax rate throughout the chapter, in-chapter examples, self-test problems, end-of-chapter questions and problems
- Added new TCJA cap on tax deductibility of interest
- Added a new Finance at Work box
- Added updated financial examples

Chapter 3: Analyzing Financial Statements

- Added more discussion of how TCJA affects tax deductibility of interest and, thus once the tax deductible limit is reached, the attractiveness of debt as a source of financing
- Updated all in-chapter examples, end-of-chapter problems, and Integrated Mini-Case to reflect new tax laws



Chapter 4: Time Value of Money 1: Analyzing Single Cash Flows

- Updated the data in Figure 4.5 on gold prices
- Updated the gold return data in the Mini-Case

Chapter 5: Time Value of Money 2: Analyzing Annuity Cash Flows

• Updated discussions to current events

Chapter 6: Understanding Financial Markets and Institutions

- Updated figures and tables throughout the chapter
- Noted that the TCJA has put a \$10,000 limit on tax relief on interest on municipal bonds

Chapter 7: Valuing Bonds

- Updated Figures 7.1–7.5 on bond issuance, interest rate path, yield to maturities, new bond quotes, and a summary of the bond market
- Updated Marginal Tax Brackets in Self-Test Problem #3
- Changed problem answers in Connect to reflect previous change in Treasury bond quote format

Chapter 8: Valuing Stocks

- Updated all table and figure values in the body of the chapter
- Updated the coverage of the stock market exchange in Section 8.2 to discuss the changes that have occurred in the NYSE and elsewhere
- Revised examples to include new firm data and solution figures

Chapter 9: Characterizing Risk and Return

- Revised the example that runs throughout the chapter to replace Staples with Boeing
- Updated all table and figure values in the body of the chapter
- Updated Timeout 9-2 and 9-4
- Revised Example 9-1 to discuss the failed Broadcom takeover of Qualcomm
- Revised Example 9-2 to include Boeing and Bank of America
- Revised the data for the end-of-chapter Excel problem
- Updated the data in the Mini-Case problem

Chapter 10: Estimating Risk and Return

- Updated values and data in Tables 10.1–10.4
- Changed discuss and Figure 10.2 to be about Disney
- Updated the Mini-Case data
- Updated data for end-of-chapter Excel problem

Chapter 11: Calculating the Cost of Capital

• Added new TCJA corporate tax rate throughout the chapter, in-chapter examples, self-test problems, and end-of-chapter questions and problems



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- Updated Viewpoints to reflect revised corporate and personal tax rates
- Revised conceptual material throughout chapter to reflect the fact that, under TCJA, some interest on debt may not be fully tax deductible, while at the same time more capital expenditures are now immediately expensable using bonus depreciation or increased Section 179 deductions
- Updated Equation 11-1 and added Equation 11-2 to reflect two possible cases for the deductibility of debt interest
- Revised discussion of corporate tax rates in calculation of project WACC

Chapter 12: Estimating Cash Flows on Capital Budgeting Projects

- Added new TCJA corporate tax rate throughout the chapter, in-chapter examples, self-test problems, and end-of-chapter questions and problems
- Updated Viewpoints to reflect revised corporate tax rates
- Revised discussion of calculation of OCF and total cash flows to reflect updated corporate tax rates
- Added discussion of bonus depreciation revised discussion of Section 170 deductions to reflect TCJA

Chapter 13: Weighing Net Present Value and Other Capital Budgeting Criteria

- Clarified the discussions of discounted payback and internal rate of return
- Refined the discussion of why using rate-based and time-based decision statistics to choose across projects can be misleading with regards to NPV

Chapter 14: Working Capital Management and Policies

• Refined discussion of the rationale for NWC and the tradeoffs inherent in having too little or too much

Chapter 15: Financial Planning and Forecasting

• Added new TCJA corporate tax rate throughout the chapter, in-chapter examples, self-test problems, and end-of-chapter questions and problems

Chapter 16: Assessing Long-Term Debt, Equity, and Capital Structure

- Added new TCJA corporate tax rate throughout the chapter, in-chapter examples, self-test problems, and end-of-chapter questions and problems
- Updated Viewpoints to reflect revised personal tax rates

Chapter 17: Sharing Firm Wealth: Dividends, Share Repurchases, and Other Payouts

- Revised discussion of investors' preferences for dividends or capital gains in light of TCJA changes
- Updated illustration of GE's dividend policy to reflect revised corporate dividend policy

Chapter 18: Issuing Capital and the Investment Banking Process

- Updated all figures, tables, and values throughout the chapter
- Added discussion of large bank versus small bank business loan activity
- Added discussion of impact of rising interest rates on debt and equity issuance

Chapter 19: International Corporate Finance

- Revised the chapter introduction to include new data about Starbucks
- Updated all table and figure values and data in the body of the chapter
- Updated Example 19-1 to include new exchange rate data

Chapter 20: Mergers and Acquisitions and Financial Distress

- Updated all figures, tables, and values throughout the chapter
- Added discussion of ATT/Time-Warner merger
- Added defaults of investment grade versus speculative grade debt
- Added a new Finance at Work box

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Unique Features

CONNECTING CORE CONCEPTS

Learning Goals appear at the beginning of each chapter and are indicated throughout the text next to headings, examples, summary, and end-of-chapter problems to which they relate. These outcomes help instructors structure their classes and assign readings and homework. The accompanying test bank provides instructors with hundreds of questions organized by level and learning goals to make customization even easier!

Learni	ng Goals		
LG5-1	Compound multiple cash flows to the future.	LG5-7	Explain the impact of com- pound frequency and the dif-
LG5-2	Compute the future value of frequent, level cash flows.		ference between the annual percentage rate and the effec-
LG5-3	Discount multiple cash flows to the present.	LG5-8	Compute the interest rate of annuity payments
LG5-4	Compute the present value of an annuity.	LG5-9	Compute payments and amor-
LG5-5	Figure cash flows and pres- ent value of a perpetuity.	LG5-10	mortgage loans.
LG5-6 Adjus of-per	Adjust values for beginning- of-period annuity payments.		Calculate the number of pay- ments on a loan.

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finance at work

JP MORGAN'S \$9 BILLION BLUNDER

JP Morgan Chase & Co. is reeling after a huge trading bet In working in clase & QC is releng and if high adding is possible to companies. In April or 2012, intesp policular losses general backfield and left the bank with the least \$\$ blank in losses is backfield and left the bank with the least \$\$ blank in losses is a discrete the bank relation to the bank's losses. According to JP Morgan Chase company fillings. Mr listifs under the security on phad approximately \$\$\$ 350 billion in investment security on the bank relation to the bank's losses. bank's Chief Investment Office (CIO), responsible for manag-ing the New York company's risk, placed a series of risky bets and trades. In an article published last month, *The Wall Street* and trades, in an article published last month, *The Wall Street* way of wh Journair reported that "large positions taken in that office by a trader nicknamed "the London whale' had rolled a sector of the debt markets. The bank, betting on a continued economic recovery with a complex web of trades tied to the values of a business.

In April of 2012, The Wall Street Journal reported that investors and hedge funds were trying to take advantage of trades made by Chase's London whale, Bruno likil, who worked out of the CIO, by making bets in the market on credit default swaps (CDSs). The CIO group previously had stopagas in place to protect and prevent the company from significant losses during periods of downturn in the economy. However, the forum the taken is 2013. The borns notivition the Journal reports that earlier in 2012, "it began reducing that position, [taking] a bullish stance on the financial health of certain companies and selling protection that would compensate buyers if those companies defaulted on debts. Mr. Iksil was a heavy seller of CDS contracts tied to a basket, or index,

Want to Know More?

of companies." In April of 2012, these protection costs began

markets

ties, about 15% of the bank's total assets, on December 31, ties, about 15% of the bank's total assets, on December 31, 2011. Mc Dimon said the bank has an extensive review under way of what went wrong. "These were grievous mistakes, they were self-inflicted, we were accountable and we hap-pened to violate our own standards and principles by how we want to operate the company. This is not how we want to run a busineer:

recovery with a complex web of trades tied to the values of corporate bonds, was hit hard when prices moved against it starting last month, causing losses in many of its derivatives positions. The losses occurred while J.P. Morgan tried to scale lack that trade." Morgan tried to scale in April of 2012, *The Wall Street Journal* reported that more volatile and less effective ... than we thought." Dimon resolves, "We will learn from it, we will it nic, we will move on, hopefully in the end, it will make us a better company." Though JP Morgan Chase came through the financial crisis better off than many other financial institutions, this trading loss certainly transistes their reputation. Mc Dimon reports that the loss is "slightly more than \$2 billion" in the second quarter of this was used than the more than the lot for long ware antimation. of this year. Less than two months later, losses were estimated

Source: Dan Fitzpatrick, Gregory Zuckerman, and Liz Rappaport, "J.P. Mor-gan's \$2 Billion Blunder," *The Wall Street Journal Online*, May 11, 2012. JP Morgan Chase & Co. Business Update Call, May 10, 2012.

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Time Out boxes, featured at the end of sections, test students' understanding of the key terms and core concepts just presented. Answers to the Time Out questions appear at the end of each chapter.

Key Words to Search for Updates: JPMorgan, London

Finance at Work boxes highlight current events and hot topics noted in the news. The Want to Know More? feature in each box contains suggested words to use for searching the Internet for updates. These features are great to use for class discussion or as homework assignments.

TIME OUT

3.1

What are the three major liquidity ratios used in evaluating financial statements?

- 3-2 How do the three major liquidity ratios used in evaluating financial statements differ
- Does a firm generally want to have high or low liquidity ratios? Why? 3-3

ANSWERS TO TIME OUT

3-1 The three most commonly used liquidity ratios are the current ratio, the quick (or test) ratio, and the cash ratio.

3-2 The current ratio measures the dollars of current assets available to pay each dollar o current liabilities. The quick ratio measures the dollars of more liquid assets (cash and marketable securities and accounts receivable) available to pay each dollar of current liabilities. The cash ratio measures the dollars of cash and marketable securities available to pay each dollar of current liabilities

Research It! projects, perfect for individual assignments or as group projects, are included at the end of each chapter and require students to search the Web for data and other information to answer the questions.

research it! Analyzing Financial Statements

Go to the website of Wal-Mart Stores, Inc., at www.walmartstores.com and get the latest financial statements from the annual report using the following steps. Go to www.walmartstores.com. Click on Investors, then select Annual Reports; next choose Annual Reports & Proxies. This will bring the file onto your computer that contains the relevant data.

Using the most recent balance sheet and income statement, calculate the financial ratios for the firm, including the internal and sustainable growth rates.

PERSONAL PERSPECTIVE



viewpoints **REVISITED**

Business Application Solution

If the managers of DPH Tree Farm increase the firm's fixed assets by \$27 million and net working capital by \$8 million in 2022, the balance sheet would look like the one below (Table 2.5). That is, gross fixed assets increase by \$27 million, ts \$395 million; cash, accounts receivable, and inventory would increase by \$1 million, \$5 million, and \$6 million, respectively. DPH Tree Farm's total assets will thus grow by \$39 million to \$609 million by year-end 2022. This growth in assets would be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million and the remaining \$35 million will be financed with \$4 million and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in a fit \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in a fit \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and the remaining \$35 million will be financed with \$4 million in accounts payable, and \$50 million \$

Personal Application Solution

As Chris Ryan examines the 2021 financial statements for DPH Tree Farm, Inc., she needs to remember that the balance sheet reports a firm's assets, liabilities, and equity at a particular point in time, the income statement reports the total revenues and expenses over a specific period of time, the statement of cash flows shows the firm's cash flows Viewpoints, a unique feature presented at the beginning of each chapter, pose both a business and a personal problem using key chapter topics. These Viewpoints scenarios immediately set a context for the chapter and allow instructors to take class discussion in multiple directions to make key concepts clearer. Viewpoints Revisited at the end of the chapter show how these problems are solved. Viewpoints Extended leverage a variety of media to provide an extended look at each personal application raised. These are accessible online in Connect or at mhhe.com/Cornett5e.

PROBLEM-SOLVING AND LEARNING STYLES

Numbered examples in each chapter feature various perspectives, so students gain practice in solving problems in both business and individual contexts. Each example contains a list of end-of-chapter problems that are similar, in order to better model the solution process.





Each numbered example is accompanied by video guided examples. These exciting, unique features detail the solution to a key problem or concept within the chapter. For each example, students can click or tap within the eBook or follow the direct URL to find the following additional support.

- The exact example in the book is worked out in a visual, narrated format.
- A similar example is presented in a video format, which stops at decision points in the problem and asks the students to identify the next step. The video continues, explaining why the student is correct or incorrect, and continues solving the problem. This feature allows students to apply and check their learning before doing homework.

Coefficient	t of Variation
$CoV_{1950s} = \frac{4.9\%}{0.0\%} = N4$	$CoV_{1960s} = \frac{6.2\%}{1.6\%} = 3.88$
$CoV_{1970s} = \frac{6.8\%}{5.7\%} = 1.19$	$CoV_{19003} = \frac{15.19\%}{13.5\%} = 1.12$
$CoV_{19905} = \frac{12.8\%}{9.5\%} = 1.35$	$CoV_{2000s} = \frac{6.7\%}{8.7\%} = 0.77$
Which decade had the best b	ond risk-return relationship?
📜 1950s	X. 1960s
X . 1970s	💢 1980s
K . 1990s	F. 2000s
	02:20 / 02:28

- The solution to the example in the book is demonstrated using multiple calculator formats-reducing the class time needed to teach students how to use their calculators.
- The solution to the example in the book is demonstrated using Excel, to help you and your students get a basic understanding of how to set up the spreadsheets.

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Future Value of Multiple Annuities At times, multiple annuities can occur in both busi- ness and personal like. For example, you may find that you can increase the annunt of money you save each year because of a promotion or a new and bet- ter job. As an illustration, reconsider the annual \$100 deposits made for five years at 8 percent per year. This time, the deposit can be increased to \$150 for the fourth and fifth years. How can we use the annu- ity equation to compute the future value when we have two levels of cash flows? In this case, the cash flow can be categorized as two annuities. The first annuity is a \$100 cash flow for five years. The second annuity is a \$50 cash flow for two years. We demon- strate this as:	MATH COACH ANNUITES AND THE FINANCIAL CALCULATOR In the previous chapter, the level payment batton (PMI) in the financial calculators was always sets to zero because no constant pay- ments wave made every period. We use the PMT batton to input the annuly anout. For calculators, the prevent value is of the opposite sign positive versus negative from the future value. This is aloo the save with annuites. The level can filth own Wile be of the opposite sign as the future value, as the time line presented earlier shows. Now would use the financial calculator to save the problem of depositing \$100 for five years via the following inputs: N = 5, 1=8, N = 0, MII = -0.0. In this case, the input or present value is is zero because no deposit is made today. The result of computing the future value is \$366.6.
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Math Coach boxes are featured in many chapters to help avoid the most common mathematical mistakes in a particular problem.



Self-Test Problems with Solutions appear before the gradable problem sets so students can test themselves before diving into their homework.

Integrated Mini-Cases at the end of each chapter combine the chapter's key concepts into a more complex problem to help students understand how concepts and methods tie together.

integrated mini-case Working with Financial Statements Listed are the 2021 financial statements for Garners' Platoon Mental Health Care, Inc.

Spread the balance sheet and income statement. Calculate the financial ratios for the firm, including the internal and sustainable growth rates. Using the DuPont system of analysis and the industry ratios reported, evaluate the performance of the firm.

GARNERS' PL/ Balance S	ATOON MENTA Sheet as of De (in millions of	AL HEALTH CARE, INC. cember 31, 2021 dollars)	
Assets		Liabilities and Equity	
Current assets		Current liabilities	
Cash and marketable securities	\$ 421	Accrued wages and taxes	\$ 316
Accounts receivable	1,109	Accounts payable	867
Inventory	1,760	Notes payable	872
Total	\$3,290	Total	\$2,055
Fixed assets		Long-term debt	\$3,090
Gross plant and equipment	\$5,812	Stockholders' equity	
Less: Depreciation	840	Preferred stock (30 million shares)	\$ 60
Net plant and equipment	\$4,972	Common stock and paid-in surplus (200 million shares)	637
Other long-term assets	892	Retained earnings	3,312
Total	\$5,864	Total	\$4,009
Total assets	\$9,154	Total liabilities and equity	\$9,154

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Supplements



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Less Time Grading

on Populations	Page	238 / 82
26	But what is evolution? A simple definition of evolution[5] is descent with modification: "Descent" implies internative; "modification" refers to charges in trains from generation to generation. For example, we see evolution at work in the bors, tigers, and loopurts that descended from one ancestral cut species.	B
12.2 Evolutionary Thought Has	Evolution has another, more specific, definition as well. Recall from chapter 7 (2) that a gene is a DNA sequence that encodes a protein; in part, an organism's proteins determine its traits. Moreover, each gene can have multiple versions, or all lells. We have also see that a papatitise \bigcirc consists of interbending methers of the same	LCig Unit
Centuries	species (see figure 1.2 @). Biologists say that evolution occurs in a population when some alleles become more common, and others less common, from one preneration to the next. A more precise definition of evolution, then, is genetic change in a population over multiple generations.	e de la
01- 12- 02- 00-1 01- 01- 21-	According to this definition, evolution is detectable by examining a population's gene pool \bigcirc —its entire collection of genes and their alleles. Evolution is a drange in allele (requercise) \bigcirc an allele's (requency in calculated as the number of cogins of that allele, drivid by the test mathemet of alleles in the population.	L 33.
12.3 Natural Selection Molds Reduction	Suppose, for example, that a gene has 2 possible alleles, A and a. In a population of 100 diploid individuals, the gene has 200 alleles. If 160 of those alleles are a, then the frequency of a is 160/200, or 0.8. In the next generation, a may become either more or less common. Because an individual's alleles do not charge, evolution	
	revious Highlight < Previous Section Next Section > Next Highlight 🖄 🙀 A	A

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Marcia Millon Cornett Troy A. Adair Jr. John Nofsinger



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