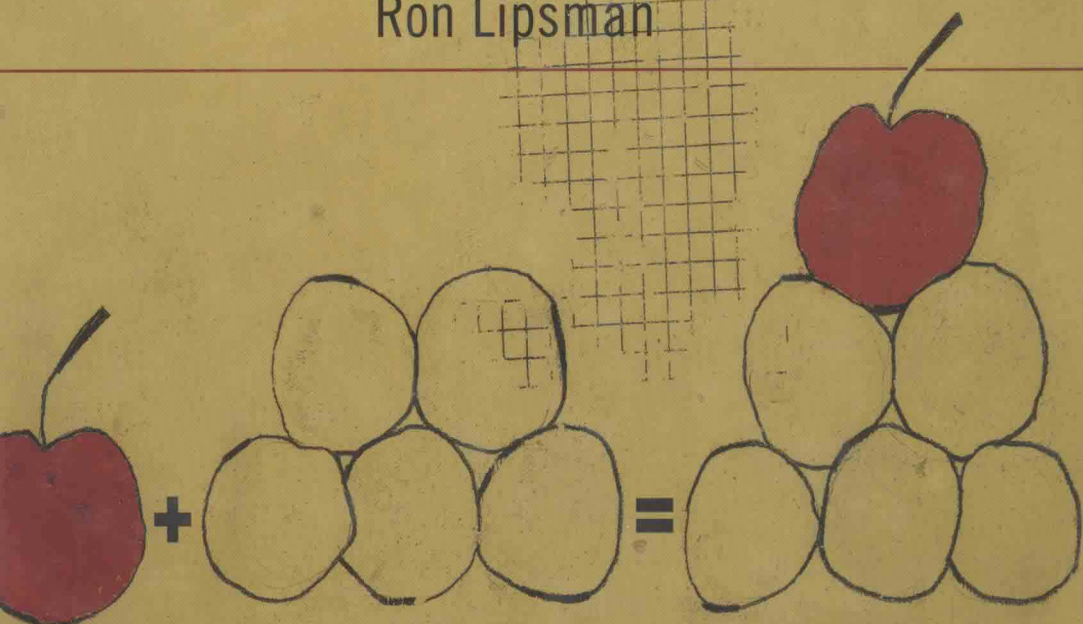


Ron Lipsman



You Can Do the Math

Overcome Your Math Phobia and
Make Better Financial Decisions

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**OVERCOME YOUR MATH PHOBIA AND
MAKE BETTER FINANCIAL DECISIONS**

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Preface

This is one of innumerable self-help or how-to books with an emphasis on financial matters that you might browse through at your local bookstore or library. Why should you buy this one and not one of the others? There is an unending supply of books that teach you how to save your money, invest your money, stay out or get out of debt, minimize the taxes you pay, buy a house, finance a car, choose between insurance policies, win the lottery, beat the market, or retire rich. Most books focus on one, or at most a few, of these highly desirable goals. This book will discuss all of them.

Moreover, the emphasis in this book is different from most in the genre. There will be no grand strategies for guaranteeing you a 12% return in the market over a decade. Nor will there be a foolproof plan that you can follow to build an annual income of \$200,000. And finally, you will not find any instructions for keeping your creditors at bay. Rather, I will demonstrate that in order for you to navigate the financial shoals of your life, you need to understand a few basic arithmetic concepts and learn how to do some simple arithmetic computations. Furthermore, recognizing that the overwhelming majority of the population is mathphobic, I will explain the concepts in the simplest possible layman's terms and provide you with an electronic tool for actually doing the computations. If you want to get a preliminary look at it, put down the book, crank up your wireless Web browser, and tune into <http://www.math.umd.edu/~rll/cgi-bin/finance.html>.

If you don't have a gadget in your pocket that will transport you to the Internet, then read on and log in when you return home or to the office—with this book in hand, of course.

THE BASIC PREMISE OF THIS BOOK

There are certain simple computations, involving no more than rudimentary arithmetic and the very basic laws of chance, that the average American Joe and Jane should be doing in the course of everyday life. But these computations are often not done for several reasons. First, people don't realize how easy they are to do. Second, and more fundamental, the computations are not done because it does not occur to people to do them. Finally, and tragically, in most people's elementary, middle, or high school educational experience the importance of doing them was not stressed, and of course Joe and Jane were not taught *how* to do them. This is particularly ironic since modern calculators and computers make the computations very easy to do.

WHAT THIS BOOK IS

The goals of the book are to reveal to you what the computations are, make them readily understandable, and by means of a very easy-to-use companion Web site enable you to do them effortlessly and informatively. For example, I will explain compound interest, and how to compute it. There will also be simple explanations of: after-tax income versus before-tax income (on investments as well as salary); how an automobile lease works financially; the odds against winning your state lottery; and the difference between credit card debt and the balance due on your home mortgage. Moreover, in every case, I will explain in lay terms the math behind the issues, and then, with the aid of the Web site, lead you through instructive and representative computations of the numbers and answers you long to know.

WHAT THIS BOOK IS NOT

This book is not a recipe for financial success. I do not claim that after reading this book you will know how to become a millionaire. In fact, all of us are subject to the fickle whims of fate and the constraints of our own financial circumstances. Recessions arise through no fault of our own; job opportunities fail to materialize; parents and children turn out to be more needy than anticipated; or illness can strike unexpectedly, and so for that matter can extreme good fortune. The point is that life is hard and often unpredictable. What is certain is that we are constantly faced with decisions, many of which have financial content and implications. We ought to equip ourselves with the best possible ammunition for making those decisions. My primary goal here is to provide you with some of that ammo. Therefore, the main thing you should expect from this book is the arithmetic tools—more precisely, the electronic tools to do the arithmetic—that will help you to make those decisions. This may not be as good as guaranteeing you a million dollars, but it is more realistic and in the end, I believe, extremely helpful.

WHO SHOULD READ THIS BOOK

My guess is that the older you are and the more experience you have had in dealing with life's financial vicissitudes, the more of this book you will already know. So my intended audience is first and foremost young people. Young people: Pay attention! This stuff is not being taught in school, and you desperately need to know it. There are countless traps out there waiting for you to fall into them. Having the financial tools I intend to impart in this book will help you to avoid those traps.

Others who will likely profit (pun intended) from this book include young adults who are no longer in school but who have already encountered some of the early needs for the arithmetical wisdom to be found in these pages, thirty-somethings with young families and not enough time or energy to think through financial matters, middle-aged folks who suspect that maybe they have not learned the lessons I would hope they should have by this point in life, aging baby-boomers who have been too busy leading the good life to notice that Father Time is bearing down on them, and finally elderly folks who, despite the fact that they know this stuff, have not figured out how to teach it to their adult children and young grandchildren—in short, *everyone*.

WHAT YOU WILL GET OUT OF IT

You will get a rudimentary understanding of the basic concepts behind the arithmetic that governs the fundamental financial questions that challenge us in life. Your math skills may not improve. Sorry about that. This is because my goal is not to teach you any math but rather to help you put some newly understood arithmetical concepts to work for you in making financial decisions. As for the arithmetic computations, that is what the companion Web site is for. You can defer all the math skills you do or don't have to the wizardry of the software that underlies the workings of the Web site. So, in summary, you get two things: some basic understanding of the arithmetical concepts that underlie the financial questions of your life, and a tool for answering those questions.

WHY I'M THE ONE TO WRITE IT

I am not a stockbroker, an insurance agent, or an accountant, and I don't work in a financial institution. I am a university professor of mathematics and an academic administrator in the science college of my university. Moreover, like many people my age, although I have none of the "formal" qualifications listed above, I do have many years of experience buying and selling stocks and mutual funds, buying and canceling insurance policies, paying college tuition, paying taxes (lord help me, I am *really* experienced at that one), spending my salary, hurling epithets at my credit card company, obtaining and disposing of cars and homes, and worrying about how I can retire comfortably. I am also good with

numbers—very good with numbers. They don't frighten me the way they do such a substantial portion of the population. I actually like them and enjoy working with them. And so when it comes to the arithmetic behind the decisions one confronts in doing all the things that I just mentioned, I don't mind crunching the numbers. I like to examine the numerical alternatives, investigate how different choices lead to different outcomes, speculate on possibilities, and act on past performance. I also have some experience in writing technical help books (I've written six of them). And finally, I have the training and experience of an educator. Therefore, all I have to do to fulfill the goals outlined in this preface is to distill the math into numbers and concepts that are simple and clear enough for you to understand—that, and design a simple-to-use Web site. When you are done breezing through this book and navigating the Web site, you can send me an email and tell me how well I succeeded.

HOW TO USE IT

The book is organized into three parts and thirteen chapters. In the first part, I discuss one of the most elementary monetary decisions that confronts a parent upon the birth of a child—namely, how to afford to educate this child. In that vein, we will investigate routine bank accounts, a phenomenon that involves the simplest and most fundamental arithmetic concept that we consider: *compound interest*. After that we will discuss inflation, and then we will explore the simplest aspects of taxes. Although taxes are one of the most painful and unpleasant features of our financial existence, the arithmetic required to understand them runs (for most taxpayers) no deeper than simple percent computations. In addition to compound interest, along with inflation (which is nothing more than a special kind of compound interest), the third fundamental topic of Part I is tax-deferred income. I will explain how it differs from income subject to normal income taxes and why it plays such a vital role in your quest for financial success.

In Part II of the book, I will discuss the seemingly routine, but often challenging, financial obstacles normally faced by American adults: your salary, and how the tax man pillages it and what you can do about that; buying and selling houses and cars (mortgage loans and vehicle leases); the gamut of insurance vehicles and how to evaluate them; and finally, credit. Then, in Part III, we advance to the most sophisticated issues that we shall explore in this book: gambling, stocks and bonds, and retirement.

There are six special types of paragraphs that you will encounter, each with a special symbol (or dingbat) so that you can identify them easily:



Paragraphs following this symbol contain a basic monetary principle. The principles are often self-evident, but I set them off like this so you will pay special attention and endeavor to remember and implement them. A simple example is: If you must choose between two bank

accounts paying the same interest rate, the one that compounds most often is the better choice.



Paragraphs following this symbol contain important cautionary notes about financial traps and hazards that may not be evident at first glance. These are areas in which you need to be very careful in financial decision-making. For example: Even if you open an account for Baby Jones, you will have to pay taxes on it at *your* marginal rate, unless you open it in some special way (such as a Uniform Gifts to Minors account).



Paragraphs following this symbol contain fundamental questions that you should ponder and hopefully will be able to answer using the wisdom and resources found in this book and the companion Web site. An example might be: When you take out a mortgage on your first home, should you try to make your down payment as large as possible in order to keep your monthly payments as low as possible, or should you borrow as much as the bank will lend you, counting on your increasing paycheck and inflation to diminish the burden of your monthly payment as the years go by?



Paragraphs following this symbol contain useful tips or asides that may not be critical to the story but may prove useful or handy after you have mastered the fundamentals. For example: The marriage penalty (to be explained later) should not stop you from getting married, but you ought to compute what it will cost you before you walk down the aisle so that you can be prepared.



Paragraphs following this symbol point you toward a spot on the companion Web site where you can do a computation. The URL is <http://www.math.umd.edu/~rll/cgi-bin/finance.html>.



Finally, paragraphs following this symbol contain personal experiences or reminiscences that are germane to the topic at hand.

Each chapter concludes with a summary statement of the primary new computation that you learned to do, even if only with the help of the Web site. A synopsis of what is covered in each of the chapters is provided in the Outline section immediately after the Introduction.

A CONFESSION

You will notice as soon as you start reading that there are some mathematical *formulas* in the body of the book. Please do not be intimidated by them. At no

point will I ask you to do any algebra or mathematics more advanced than relatively simple arithmetic. In fact, you can understand the book's contents even without doing any arithmetic, as any calculation that appears is easily checked or replicated with a basic handheld calculator. Those of you who are mathematically inclined will find some interesting crumbs to pick up and explore. For the vast majority of you who are not, I have provided explanations in English where the symbols might be confusing, and I have presented the results of all calculations. You do not have to do any of them by yourself—you can either take my word or check with your calculator. You don't need any special math background or ability to profit from this book. However, I would be less than honest if I didn't say that I do expect you, as you progress through the discussion, to recognize patterns, think logically, and appreciate coherent reasoning.

ACKNOWLEDGMENTS

I would like to thank my wife of thirty-nine years, Shelly, for reminding me periodically that my opinion is, after all, just my opinion. If indeed there is any financial wisdom in these pages, it has been distilled and purified by her sage advice and counsel. My children, Kenny and David, and their families have provided a wonderful window for me into the world of young people, just as my parents, aunts, and uncles have helped me to see the world through the eyes of the generation prior to my own. I am grateful to Arnie Lerman, of Ferris, Baker, Watts, who has been my broker for more than twenty years, during which time I managed to soak up a small part of his financial acumen. I've been inspired by the books of Ric Edelman, whom I met one time and found as sharp and witty in person as he is in his books and on television. My agent, John Willig, has been extremely helpful and solicitous of my interests, and my editor, Nick Philipson of Praeger Publishers, has been extraordinarily attentive. Finally, my hat's off to all the folks over the years who tried, sometimes successfully, to fool me, trick me, deceive me, cheat me, and generally relieve me of my money—as well as to the folks who were helpful, informative, generous, and gracious with their time, advice, and even their money.

Introduction

I began my public school career in September 1948 when I entered the first grade in P.S. 86 in the Bronx, New York. My graduation from the Bronx High School of Science in June 1960 concluded that career. In the intervening twelve years, I was privileged to encounter many dedicated and talented teachers who most diligently and patiently filled my head with an extraordinary amount of knowledge.

Very early on, I learned the names of the capital cities of every state in the forty-eight states of our great country as well as the names of the capitals of the one hundred or so countries in the world. I also learned to deftly manipulate numbers in various forms—for example, fractions, percents, and negative numbers—although the reasons for doing so were barely hinted at by my teachers. I could spell many obscure words, diagram complicated sentences, and retrieve antonyms and synonyms with ease.

As my career progressed, my storehouse of knowledge widened and deepened. I learned from my teachers, and from the wonderful books they made available, how to appreciate the plays of Shakespeare, the music of Beethoven, the novels of Dickens, and the poems of Keats and Shelley. I learned about the glorious history of Greece and Rome, the ignorance and backwardness of the Middle Ages, the reawakening of mankind during the Renaissance, and the modern triumphs of Western civilization.

My interest in mathematics and science originated in the halls of the Bronx High School of Science, whose teachers were justifiably famous for their devotion to student achievement. I learned there about DNA, the periodic table, Newton's Law of Gravity, mechanical drawing, slide rules, Euclidean geometry, and even a little calculus. Perhaps surprisingly, the humanities faculty there also managed to contribute something worthwhile to my growing wealth of

information, as I also learned about the workings of our constitutional system and a little bit about economics. Regarding government and economics, I might mention that a bias toward the left among my teachers was already evident, although I didn't recognize it for many years. For example, we spent a great deal of time on the First Amendment but none on the Second. And I learned far too much about Marx and socialism and not nearly enough about a free market economy. The name Adam Smith may have appeared in my textbooks, but none of his writings were in the syllabus, and it goes without saying that the names F. A. Hayek and Ludwig von Mises (gurus of capitalism) were nowhere to be found.

And this leads me to my main point. We live in the greatest free market economy in the history of the world. This requires that each of us, as citizens, must continually make decisions that seriously affect our financial well-being. These include simple but life-critical matters, such as: Can I afford the payments on that car? If I need to borrow \$150,000 to buy that house, what will my monthly payment be? If I bet this week's paycheck on that horse, what are my chances of winning? How much do I need to put away each month if I am going to pay for my daughter to go to Harvard in fifteen years? And then there are more sophisticated questions: How much should I contribute to my pension plan? Will my family be adequately protected by the amount of life insurance I am carrying? Is that stock overvalued?

I never learned the answers to any of those questions in school, and, I'll bet, neither did you. But if you are old enough, you certainly have had to learn them as your life has unfolded. And if you haven't, woe is you! If you are young and wise enough to be reading this book, then I am here to tell you that you are still not going to learn the answers in school. If you are in school, you may have found my litany of what I learned in school a little bizarre. In lieu of teaching you about the monumental achievements of the geniuses of Western civilization, today's public schools often concentrate more on multicultural subjects than on classical topics. But your teachers are still not about to teach you the answers to any of the fundamental life questions listed above or how to do some of the simple computations that would reveal the answers for you. The curriculum may have changed, but the economic facts of life are still not part of it. Read on, good friend, as I will so instruct you and provide you with a resource to do the math for yourself.

Outline of the Book's Content

In this outline, I provide a very brief chapter-by-chapter description of the topics and issues covered in the book. The main content of the book is organized in thirteen chapters within three parts:

I. Basic Money

1. *Saving for a College Fund*

Bank interest; simple annual interest; compound interest; frequency of compounding; computing how much a single deposit will grow into over the years with compound interest; computing how much you must deposit in order to reach a predetermined goal in a certain number of years; dealing with changing interest rates.

2. *Investing for a College Fund*

The difference between saving and investing; computing how much an account, into which regular deposits are made, will grow into over the years with compound interest; computing how much you must deposit regularly in order to reach a predetermined goal in a certain number of years; comparing account values of lump sum programs to regular deposit schemes; how to estimate answers to computations.

3. *Taking into Consideration Taxes and Inflation*

Defining, measuring and understanding inflation; inflation as a form of negative compound interest; the effect of inflation on savings and investments; coping with inflation; income taxes, tax brackets and marginal tax rates; the effect of income taxes on savings and investments; coping with taxes.

4. *How Tax-Deferred Accounts Can Help*

How income taxes influence your behavior; the meaning of “tax-deferred”; comparing tax-deferred and taxable investments; measuring the effects on both low-income and high-income individuals.

II. The Facts of Life

5. *Your Paycheck: What Is Your Salary Really Worth?*

Deductions from your paycheck (taxes, nontax but mandatory, optional); gross pay, net pay, and after-tax pay; the freedom quotient (after-tax divided by gross); strategies for maximizing your freedom quotient; the “freebie,” “pay yourself first,” and estimated tax payments; the difference between deductions, exemptions, and credits.

6. *Buying a House or Car: Mortgages and Loans*

Home loans and car loans have the same structure; collateral; how to compute the monthly payment; the portions that are interest or principal; comparisons between financing and paying cash; a closer examination of the similarities and differences between car and home loans; loan balances over time.

7. *Buying or Leasing Your Car*

Three methods to purchase a car (for cash, finance, lease); an explanation of the lease concept; financial components of a lease and how lease payments work; the dealer's role; how residual values and lease lengths affect monthly payments; psychological factors; monetary comparison of the three methods; a surprising conclusion; coping with a lack of spare cash.

8. *Owning or Renting Your Home*

New homes versus existing homes; home ownership versus rental; monthly costs; a detailed monetary comparison of monthly expenses between home ownership and rental; values of homes you can buy for monthly expenses equivalent to a rental; nonfinancial considerations in the decision; a firm recommendation for ownership.

9. *Insurance*

A precise definition of insurance; insurance is a bet; factors that enter into the decision to buy insurance; the various kinds (health, automobile, home, life, disability, umbrella, business, long-term care); other products that you don't think of as insurance but qualify according to our definition (for example, extended warranties, stock options, prenuptial agreements); Social Security, Medicare, workers' compensation, unemployment insurance; the basic principles that should guide your insurance purchases.

10. *Cut Up Those \$\$\$\$ Credit Cards*

Why we use credit cards; the history of credit cards; how they work; the main features and some of the dangers; credit cards as a weapon for you;

avoiding credit card debt; credit card facsimiles (debit cards, ATM cards, lines of credit).

III. Accumulating Wealth

11. Gambling: Can I Win the Lottery?

The universal desire to “be rich”; gambling as a tempting method to fulfill the desire; different gambling scenarios; basic probability; the expected value of a game; understanding odds and how they are determined; the numbers game (or lotteries) are particularly insidious; why state-sponsored gambling is a tax; how to gamble if you must.

12. The Stock Market and Other Investments

The basic axioms of a sustained investment program; stocks, bonds, and mutual funds; other investment vehicles; a mathematical model for a regular investment program (what you can expect to achieve); implementation and recommendations; some helpful observations.

13. Retirement

The generally accepted wisdom on retirement income needs; sources of retirement income; the role of your investment program in building a nest egg; how much money you need to retire; how long your money will last; a mathematical retirement model; more on defined benefit plans; nonfinancial retirement advice; a final summary of the book's contents.

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PART I

Basic Money