

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Record Nr.           | UNINA9910795830003321                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Autore                  | Promislow S. David                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Titolo                  | Fundamentals of Actuarial Mathematics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Pubbl/distr/stampa      | New York : , : John Wiley & Sons, Incorporated, , 2015<br>©2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| ISBN                    | 9781118782491<br>9781118782460                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Edizione                | [3rd ed.]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Descrizione fisica      | 1 online resource (554 pages)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Disciplina              | 368/.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Soggetti                | Insurance -- Mathematics<br>Business mathematics<br>Electronic books.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Lingua di pubblicazione | Inglese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Formato                 | Materiale a stampa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Livello bibliografico   | Monografia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Nota di contenuto       | Intro -- Fundamentals of Actuarial Mathematics -- Contents -- Preface -- Acknowledgements -- About the companion website -- Part I THE DETERMINISTIC LIFE CONTINGENCIES MODEL -- 1 Introduction and motivation -- 1.1 Risk and insurance -- 1.2 Deterministic versus stochastic models -- 1.3 Finance and investments -- 1.4 Adequacy and equity -- 1.5 Reassessment -- 1.6 Conclusion -- 2 The basic deterministic model -- 2.1 Cash flows -- 2.2 An analogy with currencies -- 2.3 Discount functions -- 2.4 Calculating the discount function -- 2.5 Interest and discount rates -- 2.6 Constant interest -- 2.7 Values and actuarial equivalence -- 2.8 Vector notation -- 2.9 Regular pattern cash flows -- 2.10 Balances and reserves -- 2.10.1 Basic concepts -- 2.10.2 Relation between balances and reserves -- 2.10.3 Prospective versus retrospective methods -- 2.10.4 Recursion formulas -- 2.11 Time shifting and the splitting identity -- *2.11 Change of discount function -- 2.12 Internal rates of return -- *2.13 Forward prices and term structure -- 2.14 Standard notation and terminology -- 2.14.1 Standard notation for cash flows discounted with interest -- 2.14.2 New notation -- 2.15 Spreadsheet calculations -- Notes and references -- Exercises -- 3 The life table -- 3.1 Basic definitions -- 3.2 Probabilities -- 3.3 Constructing the life table from |

the values of  $q_x$  -- 3.4 Life expectancy -- 3.5 Choice of life tables --  
 3.6 Standard notation and terminology -- 3.7 A sample table -- Notes  
 and references -- Exercises -- 4 Life annuities -- 4.1 Introduction --  
 4.2 Calculating annuity premiums -- 4.3 The interest and survivorship  
 discount function -- 4.3.1 The basic definition -- 4.3.2 Relations  
 between  $y_x$  for various values of  $x$  -- 4.4 Guaranteed payments -- 4.5  
 Deferred annuities with annual premiums -- 4.6 Some practical  
 considerations -- 4.6.1 Gross premiums.  
 4.6.2 Gender aspects -- 4.7 Standard notation and terminology -- 4.8  
 Spreadsheet calculations -- Exercises -- 5 Life insurance -- 5.1  
 Introduction -- 5.2 Calculating life insurance premiums -- 5.3 Types of  
 life insurance -- 5.4 Combined insurance-annuity benefits -- 5.5  
 Insurances viewed as annuities -- 5.6 Summary of formulas -- 5.7 A  
 general insurance-annuity identity -- 5.7.1 The general identity --  
 5.7.2 The endowment identity -- 5.8 Standard notation and  
 terminology -- 5.8.1 Single-premium notation -- 5.8.2 Annual-  
 premium notation -- 5.8.3 Identities -- 5.9 Spreadsheet applications  
 -- Exercises -- 6 Insurance and annuity reserves -- 6.1 Introduction to  
 reserves -- 6.2 The general pattern of reserves -- 6.3 Recursion -- 6.4  
 Detailed analysis of an insurance or annuity contract -- 6.4.1 Gains and  
 losses -- 6.4.2 The risk-savings decomposition -- 6.5 Bases for  
 reserves -- 6.6 Nonforfeiture values -- 6.7 Policies involving a return  
 of the reserve -- 6.8 Premium difference and paid-up formulas --  
 6.8.1 Premium difference formulas -- 6.8.2 Paid-up formulas -- 6.8.3  
 Level endowment reserves -- 6.9 Standard notation and terminology --  
 6.10 Spreadsheet applications -- Exercises -- 7 Fractional durations --  
 7.1 Introduction -- 7.2 Cash flows discounted with interest only -- 7.3  
 Life annuities paid mthly -- 7.3.1 Uniform distribution of deaths --  
 7.3.2 Present value formulas -- 7.4 Immediate annuities -- 7.5  
 Approximation and computation -- \*7.6 Fractional period premiums  
 and reserves -- 7.7 Reserves at fractional durations -- 7.8 Standard  
 notation and terminology -- Exercises -- 8 Continuous payments --  
 8.1 Introduction to continuous annuities -- 8.2 The force of discount  
 -- 8.3 The constant interest case -- 8.4 Continuous life annuities --  
 8.4.1 Basic definition -- 8.4.2 Evaluation -- 8.4.3 Life expectancy  
 revisited -- 8.5 The force of mortality.  
 8.6 Insurances payable at the moment of death -- 8.6.1 Basic  
 definitions -- 8.6.2 Evaluation -- 8.7 Premiums and reserves -- 8.8  
 The general insurance-annuity identity in the continuous case -- 8.9  
 Differential equations for reserves -- 8.10 Some examples of exact  
 calculation -- 8.10.1 Constant force of mortality -- 8.10.2 Demoivre's  
 law -- 8.10.3 An example of the splitting identity -- 8.11 Further  
 approximations from the life table -- 8.12 Standard actuarial notation  
 and terminology -- Notes and references -- Exercises -- 9 Select  
 mortality -- 9.1 Introduction -- 9.2 Select and ultimate tables -- 9.3  
 Changes in formulas -- 9.4 Projections in annuity tables -- 9.5 Further  
 remarks -- Exercises -- 10 Multiple-life contracts -- 10.1 Introduction  
 -- 10.2 The joint-life status -- 10.3 Joint-life annuities and insurances  
 -- 10.4 Last-survivor annuities and insurances -- 10.4.1 Basic results  
 -- 10.4.2 Reserves on second-death insurances -- 10.5 Moment of  
 death insurances -- 10.6 The general two-life annuity contract -- 10.7  
 The general two-life insurance contract -- 10.8 Contingent insurances  
 -- 10.8.1 First-death contingent insurances -- 10.8.2 Second-death  
 contingent insurances -- 10.8.3 Moment-of-death contingent  
 insurances -- 10.8.4 General contingent probabilities -- 10.9 Duration  
 problems -- \*10.10 Applications to annuity credit risk -- 10.11  
 Standard notation and terminology -- 10.12 Spreadsheet applications  
 -- Notes and references -- Exercises -- 11 Multiple-decrement theory

-- 11.1 Introduction -- 11.2 The basic model -- 11.2.1 The multiple-decrement table -- 11.2.2 Quantities calculated from the multiple-decrement table -- 11.3 Insurances -- 11.4 Determining the model from the forces of decrement -- 11.5 The analogy with joint-life statuses -- 11.6 A machine analogy -- 11.6.1 Method 1 -- 11.6.2 Method 2 -- 11.7 Associated single-decrement tables. 11.7.1 The main methods -- 11.7.2 Forces of decrement in the associated single-decrement tables -- 11.7.3 Conditions justifying the two methods -- 11.7.4 Other approaches -- Notes and references -- Exercises -- 12 Expenses and profits -- 12.1 Introduction -- 12.2 Effect on reserves -- 12.3 Realistic reserve and balance calculations -- 12.4 Profit measurement -- 12.4.1 Advanced gain and loss analysis -- 12.4.2 Gains by source -- 12.4.3 Profit testing -- Notes and references -- Exercises -- \*13 Specialized topics -- 13.1 Universal life -- 13.1.1 Description of the contract -- 13.1.2 Calculating account values -- 13.2 Variable annuities -- 13.3 Pension plans -- 13.3.1 DB plans -- 13.3.2 DC plans -- Exercises -- Part II THE STOCHASTIC LIFE CONTINGENCIES MODEL -- 14 Survival distributions and failure times -- 14.1 Introduction to survival distributions -- 14.2 The discrete case -- 14.3 The continuous case -- 14.3.1 The basic functions -- 14.3.2 Properties of -- 14.3.3 Modes -- 14.4 Examples -- 14.5 Shifted distributions -- 14.6 The standard approximation -- 14.7 The stochastic life table -- 14.8 Life expectancy in the stochastic model -- 14.9 Stochastic interest rates -- Notes and references -- Exercises -- 15 The stochastic approach to insurance and annuities -- 15.1 Introduction -- 15.2 The stochastic approach to insurance benefits -- 15.2.1 The discrete case -- 15.2.2 The continuous case -- 15.2.3 Approximation -- 15.2.4 Endowment insurances -- 15.3 The stochastic approach to annuity benefits -- 15.3.1 Discrete annuities -- 15.3.2 Continuous annuities -- \*15.4 Deferred contracts -- 15.5 The stochastic approach to reserves -- 15.6 The stochastic approach to premiums -- 15.6.1 The equivalence principle -- 15.6.2 Percentile premiums -- 15.6.3 Aggregate premiums -- 15.6.4 General premium principles -- 15.7 The variance of  $rL$ . 15.8 Standard notation and terminology -- Notes and references -- Exercises -- 16 Simplifications under level benefit contracts -- 16.1 Introduction -- 16.2 Variance calculations in the continuous case -- 16.2.1 Insurances -- 16.2.2 Annuities -- 16.2.3 Prospective losses -- 16.2.4 Using equivalence principle premiums -- 16.3 Variance calculations in the discrete case -- 16.4 Exact distributions -- 16.4.1 The distribution of  $Z$  -- 16.4.2 The distribution of  $Y$  -- 16.4.3 The distribution of  $L$  -- 16.4.4 The case where  $T$  is exponentially distributed -- 16.5 Some non-level benefit examples -- 16.5.1 Term insurance -- 16.5.2 Deferred insurance -- 16.5.3 An annual premium policy -- Exercises -- 17 The minimum failure time -- 17.1 Introduction -- 17.2 Joint distributions -- 17.3 The distribution of  $T$  -- 17.3.1 The general case -- 17.3.2 The independent case -- 17.4 The joint distribution of  $(T, J)$  -- 17.4.1 The distribution function for  $(T, J)$  -- 17.4.2 Density and survival functions for  $(T, J)$  -- 17.4.3 The distribution of  $J$  -- 17.4.4 Hazard functions for  $(T, J)$  -- 17.4.5 The independent case -- 17.4.6 Nonidentifiability -- 17.4.7 Conditions for the independence of  $T$  and  $J$  -- 17.5 Other problems -- 17.6 The common shock model -- 17.7 Copulas -- Notes and references -- Exercises -- Part III ADVANCED STOCHASTIC MODELS -- 18 An introduction to stochastic processes -- 18.1 Introduction -- 18.2 Markov chains -- 18.2.1 Definitions -- 18.2.2 Examples -- 18.3 Martingales -- 18.4 Finite-state Markov chains -- 18.4.1 The transition matrix -- 18.4.2 Multi-period transitions -- 18.4.3 Distributions --

\*18.4.4 Limiting distributions -- \*18.4.5 Recurrent and transient states  
-- 18.5 Introduction to continuous time processes -- 18.6 Poisson  
processes -- 18.6.1 Waiting times -- 18.6.2 Nonhomogeneous Poisson  
processes -- 18.7 Brownian motion -- 18.7.1 The main definition.  
18.7.2 Connection with random walks.

---

Sommario/riassunto

Provides a comprehensive coverage of both the deterministic and stochastic models of life contingencies, risk theory, credibility theory, multi-state models, and an introduction to modern mathematical finance. New edition restructures the material to fit into modern computational methods and provides several spreadsheet examples throughout. Covers the syllabus for the Institute of Actuaries subject CT5, Contingencies Includes new chapters covering stochastic investments returns, universal life insurance. Elements of option pricing and the Black-Scholes formula will be introduced.

---