Mathematics

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Preface

This is a Quarto book.

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1 Reading List

1.1 Problem Solving

1.1.1 Introductory

Polya

- Mathematics and Plausible Reasoning Vol 1 - Induction and Analogy in Mathematics. Polya
- Mathematics and Plausibe Reasoning Vol 2 - Patterns of Plausible Inference. Polya
- How to Solve It - A New Aspect of Mathematical Method. Polya
- Mathematical Discovery - On Understanding, Learning, and Teaching Problem Solving. Polya

Teaching Math

- Guide to Teaching Puzzle-based Learning. Meyer III, et al
- How to Teach Mathematics (3rd ed). Krantz
- Ahmes' Legacy - Puzzles and the Mathematical Mind. Marcel Danesi
- An Anthropology of PUzzles. Danesi

Higgins

- Mathematics for the Curious. Higgins
- Mathematics for the Imagination. Higgins
- Nets, Puzzles, and Postmen - an Exploration of Mathematical Connections. Higgins

1.1.2 Problem-Solving and Mathematical Thinking

- Ants, Bikes, and Clocks. William Briggs
- Problem-solving Through Recreational Mathematics. Averbach, Chein
- Discovering Mathematics - The Art of Investigation. Gardiner
- A Mathematical Mosaic - Patterns & Problem-Solving. Ravi Vakil

- Exploring Mathematics - Problem-solving and Proof. Grieser
- Mathematical Thinking - Problem-Solving and Proofs (2nd ed). D'Angelo, West
- Proofs and Refutations. Imre Lakatos
- Wearing Gauss's Jersey. Hathout
- Mathematical Problem Solving. Schoenfield
- How to Solve Problems. Wickelgren
- Mathematical Problems - An Essay on Their Nature and Importance. Smorynski
- Thinking Mathematically. Mason, Burton
- Techniques of Problem Solving. Krantz
- Essentials of Mathematical Thinking. Krantz
- Mathematical Labyrinths - Pathfinding. Boris Pritsker
- Expanding Mathematical Toolbox: Interweaving Topics, Problems, and Solutions. Boris Pritsker

Math-olympiad Oriented

- The Art and Craft of Problem Solving. Zeitz
- Problem-solving Through Problems. Larson
- Mathematics as problem Solving (2nd ed). Soifer
- Problem-solving Strategies. Engel
- Winning Solutions. Lozansky, Rousseau
- Principles of Mathematical Problem Solving. Erickson
- Mathematical Olympiad Challenges (2nd ed). Andreescu, Gelca

Puzzle-books, and Problem Collections

- Mathematical Puzzles - A Connoisseur's Collection. Winkler
- Wheels, Life, and Other Mathematical Amusements. Gardner
- Hexaflexagons, Probability Paradoxes, and the Tower of Hanoi. Gardner
- Origami, Eleusis, and the Soma Cube. Gardner
- Cows in the Maze and Other Mathematical Explorations. Stewart
- The Magical Maze - Seeing the World Through Mathematical Eyes. Stewart
- Math Hysteria - Fund and Games with Mathematics. Stewart
- Mathematical Puzzling. Gardiner
- Mathematical Mind Benders. Winkler
- Sink or Float? - Thought Problems in Math and Physics. Kendig
- Problems for Methematicians, Young and Old. Paul R. Halmos
- Which Way Did the Bicycle Go - and Other Intriguing Mahtematical Mysteries. Konhauser, Velleman, Wagon
- 100 Great Problems of Elementary Mathematics - Their History and Solution. Doerrie
- Professor Higgins' Problem Collection. Higgins

- Aha! Solutions. Martin Erickson
- Mathematical Diamonds. Honsberger
- Riddles in Mathematics. Northrop, Van Nostrand

1.1.3 Algorithmic Problem Solving and Computational Thinking

- Algorithmic Problem Solving. Backhouse
- Algorithmic Puzzles. Levitin, Levitin
- Puzzles, Paradoxes, and Problem Solving - An Introduction to Mathematical Thinking. Reba, Shier
- The Power of Computational Thinking - Games, magic and puzzles to help you become a computational thinker. Curzon, McOwan
- Conjuring with Computation - A Manual of Magic and Computing for Beginners. Curzon, McOwan

Estimation, Soft Problem-solving Skills, Math in Everyday Life

- Mathematics in Everyday Life. John Haigh
- Towing Icebergs, Falling Dominoes, and Other Adventures in Applied Mathematics. Robert B Banks
- Guesstimation - Solving the World's Problem on the Back of a Cocktail Napkin. Weinstein, Adam
- Guesstimation 2.0 - Solving the World's Problem on the Back of a Cocktail Napkin. Weinstein
- Street-fithging Mathematics - The Art of Educated Guessing and Opportunistic Problem Solving. Mahajan
- Strength in Numbers: Discovering the Joy and Power of Mathematics in Everyday Life. Sherman K Stein
- The Invisible Power of Mathematics: The Pervasive Impact of Mathematical Engineering in Everyday Life. Samaey, Vandewalle
- Conceptual Blockbusting - A Guide to Better Ideas. James L. Adams
- Rapid Viz - A New Method for the Rapid Visualization of Ideas. Hanks, Belliston
- Design it Yourself. Hansk, Belliston, Edwards
- The Universal Traveler - A Soft-Systems Guide to Creativity, Problem-Solving, & the Process of Reaching Goals. Koberg, Bagnall
- Experiences in Visual Thinking. McKim
- Applied Imagination - Priciples and Procedures of Creative Thinking. Osborn
- Wake Up Your Creative Genius. Hanks, Parry
- Synectics - The Development of Creative Capacity. Gordon
- The Metaphorical Way of Learning * Knowing - Applying Synectics to Sensitivity and Learning Situations. Gordon

1.1.4 General Math Books

- Mathematics and Logic. Kac & Ulam
- Mathematics -The Science of Patterns. Devlin
- Mathematics - The Man Made Universe. Stein
- Invitation to Mathematics. Konrad Jacobs
- Uses of Infinity. Zippin
- The Enjoyment of Mathematics - Selections from Mathematics for the Amateur. Rademacher, Toeplitz
- Mathematics - From the Brith of Numbers. Jan Gullberg
- Mathematics for the Million. Hogben
- The Pleasures of Counting. Koerner
- The Search for Pattern. Sawyer
- Mathematicians Delight. Sawyer
- A Path to Modern Mathematics. Sawyer
- Concepts of Modern Mathematics. Ian Stewart
- Mathematical Vistas - From a Room With Many Windows. Hilton, Holton, Pedersen
- A Mathmeatical Tapestry - Demonstrating the Beautiful Unity of Mathematics. Hilton, Pedersen
- The Role of Mathematics in Science. Schiffer, Bowden
- Mathematical Methods in Science. Polya
- Ingenuity in Mathematics. Honsberger
- A Mathematicians Lament - How School Cheats Us Out of Our Most Fascinating and Imaginative Art. Paul Lockhart
- Arithmetic. Paul Lockhart
- Measurement. Paul Lockhart
- The Art of the Infinite - The Pleasures of Mathematics. Kaplan, Kaplan
- Astronomer Priest and Ancient Mariner. Hogben
- Mathematics - From the Brith of Numbers. Gullberg
- Alice in Wonderland - A Student's Guide to the Enjoyment of Higher Mathematics. Baylis, Haggarty
- The Concept of Number: From Quaternions to Monads and Topological Fields. Artmann

1.1.5 Proofs

- The Book of Proof. Hammack
- Proofs - A Long-Form Mathematics Textbook. Cummings
- Reading, Writing, and Proving - A Closer Look at Mathematics. Daepp, Gorkin
- Charming Proofs - A journey Into Elegant Mathematics. Alsina, Nelsen
- Mathematical Proofs - A Transition to Advanced Mathematics. Chartrand, Polimeni, Zhang
- How to Prove it - A Structured Approach. Velleman

1.1.6 Practical Mathematical Models (Physical Objects)

- Mathematical Models. Cundy
- Designing and Making. Sawyer

1.2 Symmetry

1.2.1 General, Intro

- Symmetry Rules - How Science and Nature Are Founded on Symmetry. Joe Rosen
- Symmetry, Shape, and Space - An Introduction to Mathematics Through Geometry. Kinsey, Moore
- Symmetry - Cultural-historical and Ontological Aspects of Science-Arts Relations, The Natural and Man-Made World in an Interdisciplinary Approach. Darvas
- Manifold Mirrors - The Crossing Paths of the Arts and Mathematics. Felipe Cucker
- Symmetry - A Journey Into the Patterns of Nature. Sautoy
- Symmetry. Walser
- Symmetry Discovered. Rosen
- The Equation That Couldn't Be Solved - How Mathematical Genius Discovered the Language of Symmetry. Mario Livio
- Connections - The Geometric Bridge Between Art and Science. Jay Kappraff
- Symmetry and the Monster - One of the greateset Quests of Mathematics. Ronan
- Fearful Symmetry - is God a Geometer? Ian Stewart, Martin Golubitsky
- Symmetry - Unifying Human Understanding. Hargittai
- Beyond Measure - A Guided Tour Through Nature, Myth, and Number. Jay Kappraff
- Symmetry - A Unifying Concept. Hargittai, Hargittai
- Symmetry and the Beautiful Universe. Lederman

1.2.2 Golden Ration Specific

- The Divine Proportion - A Study in Mathematical Beauty. Huntley
- Der Goldene Schnitt. Beutelspacher, Petri
- The Golden Ratio - The Story of Phi, The World's Most Astonishing Number. Mario Livio
- the Golden Ratio - The Divine Beauty of Mathematics. Gary B. Meisner
- The Golden Section. Hans Walser

1.2.3 Physical, Chaos, Fractals

- Chaos and Fractals - New Frontiers of Science (2nd ed). Peitgen, Juergens, Saupe
- Fractals, Chaos, Power Laws - Minutes from an Infinite Paradise
- Symmetry and Complexity - The Spirit and Beauty of Nonlinear Science. Mainzer
- The Comprehensible Cosmos - Where do the Laws of Physics Come From? Stenger
- Lawas and Meta-laws of nature: Conversation Laws and Symmetries. Marc Lange
- Similarities in Physics. Shive, Weber
- Perpetual Motion - Electrons and Atoms in Crystals. Alec T Stewart
- Symmetry in Chaos - A Search for Pattern in Mathematics, Art, and Nature (2nd ed). Field, Golubitsky
- Complexity - A Guided Tour. Melanie Mitchell
- Symmetries in Physics - Philosophical Reflections. ed Brading, Castellani
- Classification, Symmetry, and the Periodic Table. William B Jensen
- Asymmetry: The Foundation of Information. Scott J. Muller
- The Fabric of the Cosmos - Space, Time, and the Texture or Reality. Brian Greene
- The Ghost in the Atom. ed Davies, Brown
- Information and Its Role in Nature. Roederer

Fractals Specific

- Fractals - A Very Short Introduction. Falconer
- Chaos and Fractals - An Elementary Introduction. Feldman
- The Fractal Geometry of Nature. Mandelbrot
- Fractals and Chaos - An Illustrated Course. Addison
- Fractals for the Classroom Part One - Introduction to Fractals and Chaos. Peitgen, Juergens, Saupe
- Introduction to Fractals and Chaos. Crownover
- Chaos, Bifurcations, and Fractals Around Us - A Brief Introduction. Szepmlinka-Stupnicka
- Chaotic Dynamics - An Introduction Based on Classical Mechanics. Tel, Gruiz
- Chaotic Dynamics - Fractals, Tilings, and Substitutions. Goodson
- Measure, Topology, and Fractal Geometry. Edgar
- Fractal Geometry - Mathematical Foundations and Applications. Falconer
- Exploring Randomness. Chaitin

1.2.4 Group Theory, Algebra, Mathematical

- Symmetries. Johnson
- Algebra - Abstract and Concrete. Goodman
- Differential Equations - Their Solution Using Symmetries. Stephani, Maccallum

- Equivalence, Invariants, and Symmetry. Olver

1.2.5 Visual, Design, Solid Geometry

- Logic and Design - In Art, Science, and Mathematics. Krome Barrat
- Fragments of Inifnity - Kaleidoscope of Math and ARt. Ivars Peterson
- Visual Symmetry. Hargittai, Hargittai
- Geometry of Design - Studies in Proportion and Composition. Kimberly Elam
- The Geometry of Art and Life. Matila Ghyka
- A Practical Handbook of Geometrical Composition and Design. Matila Ghyka
- The Elements of Dynamic Symmetry. Jay Hambridge
- The Beautiful Necessity - Seven Essays on Theosophy and Architecture. Claude Bragdon
- The Geometrical Foundation of Natural Structure - A Source Book of Design. Robert Williams
- Order in Space - A Design Source Book. Keith Critchlow

1.2.6 Analogy

- Models and Analogies in Science. Mary Hesse
- Surfaces and Essences - Analogy as the Fuel and Fire of Thinking. Douglas Hofstadter, Emmanuel Sander
- The Metaphorical Way of Learning & Knowing - Applying Synectics to Sensitivity and Learning Situations. Gordon, Poze

1.2.7 Alternative

- The Myth of Invariance - The Origin of the Gods, Mathemateics and Music From the Rg Veda to Plato. Ernest G McClain
- Philomath - The Geometric Unification of Science and Art Through Number. Grant, Ghannam
- Quadrivium - The Four Classical Liberal Arts of Number, Geometry, Music & Cosmology. Keith Critchlow
- Mathematics Useful for Understanding Plato. Theon of Smyrna

1.3 Geometry

1.3.1 Constructive Geometry

- Drawing Geometry. John Allen

- Ruler & Compass - Practical Geometric Constructions. Andrew Sutton
- Exploring Classical Greek Construction Problems with Interactive Geometry Software. Meskens, Tytgat
- Construction of Polygons. Duerer
- Geometric Constructions. Martin

Design & Compositoin

- Geometrical Composition and Design. Ghyka
- Geometry of Design - Studies in Proportion and Composition. Elam

Engineering Graphics

- Geometric and Engineering Drawing (4th ed). Kenneth Morling

1.3.2 Classical Foundations

- Geometry - A Highschool Course. Lang, Murrow
- Geometry (2nd ed). Harold R Jacobs
- Geometry Revisited. Coxeter, Greitzer
- Geometry. Gelfand

1.3.3 Broad Classical & Early Modern Overview

- Classical Geometry - Euclidean, Transformational, Inversive, and Projective. Leonard, Lewis, Liu, Tokarsky
- Geometry: Euclid and Beyond. Robin Harsthorne
- Geometry (2nd ed). Brannan, Esplen, Gray
- The Four Pillars of Geometry. Stillwell
- Continious Symmetry - from Euclid to Klein. Banker, Howe
- Plane and Solid Geometry. Aarts
- The Geometric Viewpoint - A Survey of Geometries. Sibley
- Geometry - Plane and Fancy. Singer
- A Survey of Geometry (2nd ed). Eves
- The Foundations of Geometrey and the Non-Euclidean Plane. Martin
- Geometry - A Comprehensive Course. Dan Pedoe
- Geometry and The Imagination. Hilbert, Cohn-Vossen

1.3.4 Tranformational & Projective Geometry

- Geometric Transfomrations I, II, III. Yaglom
- Transformational Plane Geometry. Umble, Han
- Projective Geometry: From Foudnations to Applications. Beutelspacher, Rosenbaum
- Geometrische Perspektive. Rehbock

1.3.5 Surfaces, Differential Geometry & Modern Bridges

- The Shape of Space (3rd ed). Weeks
- The Geometry of Curves. Rutter
- Geometry of Surfaces. Stillwell
- Geometry. Audin
- Euler's Gem - The Polyherdron Formula and the Brith of Topology. Richeson
- Geometry and Topology. Reid, Szendroi

1.3.6 Conceptual Supplements & Other Topics

- Conics and Cubics - A Concrete Introduction to Algebraic Curves. Robert Bix
- Complex Numbers and Geometry. Hahn
- Journey into Geometries. Coxeter, Stillwell

1.4 Discrete Mathematics

1.4.1 General

- Mathematical Structures for Computer Science - Discrete Mathematics and Its Applications. Gersting
- Discrete Mathematics for Computer Science. Golovnev
- Diskrete Mathematik fuer Einsteiger - Mit Anwendungen in Technik und Informatik. Beutelspacher, Zchiegner
- Discrete Mathematics for Computer Science - An Example-Based Introduction. Jon Pierre Fortney
- Introduction to Mathematical Structures and Proof. Gerstein
- Discrete Mathematics. Chartrand, Zhang
- Discrete Mathematics and its Applications. Rosen
- Discrete and Combinatorial Mathematics. Grimaldi
- Discrete Mathematics. Johnsonbauch
- Discrete Mathemetics for Computer Science. David Liben-Nowell
- Discrete Mathematics and Functional Programming. VanDrunen

- Concrete Mathematics. Knuth, Graham

1.4.2 Combinatorics

Older Intro

- Mathematics of Choice or How to Count Without Counting. Ivan Niven
- Introduction to Combinatorics (1972). Berman, Fryer
- Principles of Combinatorics (1971). Berge

General Intro

- Introductory Combinatorics. Brualdi
- Combinatorics Through Guided Discovery. Bogart
- Applied Combinatorics (3rd ed). Roberts, Tesman
- Introduction to Combinatorics. Martin J Erickson
- Counting - the Art of Enumerative Combinatorics. George E Martin
- How to Count - An Introduction to Combinatorics and Its Applications. Beeler
- A Walk Through Combinatorics - An Introductin to Enumeration and Graph Theory. Miklos Bona
- Applied Combinatorics. Alan Tucker

Advanced

- Combinatorial Mathematics (has solution manual). Douglas B West
- Aspects of Combinatorics - A wide-randing Introduction. Victor Bryant
- Combinatorics - Topics, Techniques, Algorithms. Peter Cameron

Math Olympiad & Problem Oriented

- Applied Combinatorics with Problem Solving. Jackson, Thoro
- Combinatorics - A Problem Oriented Approach. Daniel A Marcus
- Principles and Techniques of Combinatorics. (has solution manual) Chuan-Chong, Khee-Meng

- Problem-Solving Methods in Combinatorics - An Approach to Olympiad Problems. Pablo Soberon
- Combinatorics - A Problem-based Approach. Mladenovic
- A Path to Combinatorics for Undergraduates - Counting Strategoes. Andreescu, Feng
- Combinatorics. Vilenkin

- Geometric Etudes in Combinatorial Mathematics. Soifer

1.4.3 Graph Theory

General, Intro

- Graphs and Their Uses. Ore
- Graph Theory - A Problem-oriented Approach. Daniel A Marcus
- Graphen fuer Einsteiger. Nitzche
- A First Course in Graph Theory. Chartrand, Zheng
- Graph Theory - an Introduction to Proofs, Algorithms, and Applications. Saoub
- A First Look at Graph Theory. Clark, Holton
- Introduction to Graph Theory (2nd ed). (has sol manual). Douglas West
- Graph Theory with Applications. Bondy

Algorithmic

- Algorithmic Graph Theory. Gibbons
- Algorithmic Graph Theory. McHugh

Conceptual, Supplementary

- The Fascinating World of Graph theory. Chartrand, Zhang
- Nets, PUzzles, and Postmen - an Exploration of Mathematical Connections. Peter M Higgins

1.4.4 Number Theory

- Number Theory - A Historical Approach. John J Watkins
- Elementary Number Theory & its Applications (6th ed). Rosen
- Elementary Number theory. Jones, Jones
- Elementary Number Theory in Nine Chapters (2nd ed). Tattersall
- Recreations in the Theory of Numbers. Albert H Beiler
- A Friendly Introduction to Number Theory. Silverman
- A Guide to Elementary Number Theory. Dudley

Computational, Programming

- Elementary Number Theory: Primes, Congruences, and Secrets - A Computational Approach with Sagemath. Stein
- Number Theory in Context and Interactive. Karl-Dieter Crisman
- Primes and Programming - An Introduction to Number Theory with Computing. Peter Giblin

Conceptual, Supplementary

- From Zero to Infinity - What makes Numbers Interesting. Constance Reid
- Das Kleine Buch der Zahlen - Vom Abzaehlen bis zur Kryptographie. Peter M Higgins
- The Book of Numbers. Conway, Guy

1.4.5 Crytpography / Crytpology

- Introduction to Cryptography with Open Source Software. Alasdair McAndrew
- Understanding Cryptography - A Textbook for Students and Practitioners. Paar, Pelzl
- Cryptology. Albert Beutelspacher

Cryptanalysis

- Decrypted Secrets - Methods and Maxims of Cryptology. Bauer
- Elementary Cryptanalysis. Sinkov
- Cryptanalysis - A Study of Ciphers and their Solution. Helen Fouche Gaines

Applied Cryptography / Cybersecurity

- Implementing Cryptography Using Python. Shannon W Bray
- Full Stack Python Security - Cryptography, TLS, and attack Resistance. Dennis Byrne
- Cracking Codes with Python - An Introduction to Building and Braking Ciphers. Sweigart

Coding Theory

- Introduction to Cryptography with Coding Theory (2nd ed). Trappe, Washington
- Codes - An Introduction to Information, Communication, and Cryptography. Norman L Biggs

1.4.6 Mathmematical Logic

General

- Proof and Disproof in Formal Logic - An Introduction for Programmers. Richard Bornat
- Logic and Structure. Dirk van Dalen
- Logical Labyrinths. Smullyan
- Mathematical Logic. Joseph Mileti
- Computability and Logic (5th ed). Boolos, Burgess, Jeffrey
- The Mathematics of Logic - a Guide to Completeness Theorems and Their Applications. Richard Kaye

Computational

- Modelling Puzzles in First Order Logic. Adrian Groza
- Logic for Applications. Nerode
- The Computer Modelling of Mathematical Reasoning. Bundy

Intuitionistic

- On the Meanings of the Logical Constants and the Justifications of the Logical Laws. Per Martin-Loef

1.4.7 Set Theory

- Set Theory for Computer Science. Glynn Winskel
- Logic, Induction and Sets. Thomas Forster
- Set Theory. Derek Goldrei

1.5 Abstract Algebra

1.5.1 Intro

- Concrete Approach to Abstract Algebra. Sawyer
- Concrete Algebra - With a View Toward Abstract Algebra. McKay
- Sets, Groups, and Mappings - An Introduction to Abstract Mathematics. Hwang
- Algebra and Geometry. Beardon
- Integers, Polynomials, and Rings. Irving

1.5.2 Core

- Contemporary Abstract Algebra. Gallian
- Abstract Algebra - An Interactive Approach. William Paulsen
- Abstract Algebra - An Inquiry-based Approach. Hodge, Schlicker, Sunstrom
- Abstract Algebra - Structures and Applications. Stephen Lovett
- Abstract Algebra - A First Course. Stephen Lovett
- Introduction to Abstract Algebra. Jonathan D R Smith
- Abstract Algebra - A Gentle Introduction. Mullen, Sellers

1.5.3 With Applications

- Abstract Algebra with Applications. Terras
- Concrete Abstract Algebra. From Numbers to Groebner Bases
- Introduction to Applied Algebraic Systems. Reilly

1.5.4 Next Steps, Alternative

- Abstract Algebra - An Introduction. Hungerford
- Algebra - Notes From the Underground. Aluffi
- Algebra: Chapter 0. Aluffi
- Visual Group Theory. Nathan Carter
- Universal Algebra. Burris, Sankappanavar

1.6 Lienar Algebra

1.6.1 Basic, Intro

- An Engineering Approach to Linear Algebra. W W Sawyer
- Linear Aglebra (4th ed). Jim Hefferon
- Linear Algebra and Geometry. Cuoco et al
- Linear Algebra and Its Applications. Lay, Lay, McDonald
- Linear Aglebra Done Right. Sheldon Axler.
- Introduction to Linear Algebra. Strang
- Introduction to Linear and Matrix Algebra. Nathaniel Johnston
- Linear Algebra. Meckes, Meckes
- Linear Algebra - A Modern Introduction (4th ed). Poole
- Linear Algebra with Applications. Otto Bretscher
- A Modern Introduction to Linear Algebra. Henry Ricardo
- Linear Algebra - Geometry and Transformation. Bruce Solomon

- Practical Linear Algebra - A Geometry Toolbox (4th ed). Farin, Hansford
- Linear Algebra - Concepts and Applications. Bogacki

1.6.2 Linear Algebra with CAS

- Linear Algebra - Theory, Intuition, Code (python & matlab). Cohen
- Linear Algebra and its Applications with R. Yoshida

1.6.3 With Applications

- Applied Linear Algebra and Matrix Analysis. Thomas S Shores
- Introduction to Applied Linear Algebra - Vectors, Matrices, and Least Squares. Boyd, Vandenberghe
- Matrix Analysis and Applied Linear Algebra. Meyer
- Applied Linear Algebra. Olver, Shakiban
- Matrix Methods - Applied Linear Algebra and Sabermetrics (4th ed). Bronson, Costa
- Linear Algebra and its Applications. Peter Lax
- Linear Algebra and Learning from Data. Gibert Strang
- Linear Algebra and Matrix Analysis for Statistics. Benerjee, Roy

1.6.4 Second Course, Advanced

- Advanced Linear and Matrix Algebra. Nathaniel Johnston
- A Second Course in Linear Algebra. Garcia, Horn

1.6.5 Numerical LA

- Numerical Linear Algebra - An Introduction. Wendland
- Applied Numerical Linear Algebra. Hager

1.7 Analysis

1.7.1 Intro, First Steps

- Numbers and Functions (2nd ed). Burn
- Limits, Limits Everywhere. Applebaum
- Numbers, Sequences, and Series. Hirst
- Guide to Analysis. Mary F Hart

- Infinite Processes - Background to Analysis. Gardiner
- Calculus by and for Young People. Don Cohen

1.7.2 Core Track

- Analysis. P E Kopp
- Elementary Analysis - The Theory of Calculus. Ross
- A First Course in Mathematical Analysis. Brannan
- Mathematical Analysis - A Straightforward Approach. Binmore
- Introduction to Real Analysis. Bartle, Sherbert
- Real Mathematical Analysis. Pugh
- A First Course in Analysis. Pedrick
- Mathematical Analysis - An Introduction. Browder
  includes: topology, function spaces, diffable maps, measures, integration, manifolds, multilinear algebra etc

Later: Books by Lackzovich, and Zorich (Russia)

1.7.3 Advanced

- Measure, Integral and Probability. E Kopp

1.7.4 With Applications

- Real Analysis and Applications. Davidson, Donsig

1.8 General Applied Math

- Advanced Engineering Mathematics. Dennis G Zill
- Advanced Engineering Mathematics. Kreyszig
- Advanced Engineering Mathematics. Greenberg
- Introduction to Applied Mathematics. Sirovich
- Mathematical Methods in the Physical Sciences. Mary L Boas

1.8.1 Mathematical Methods for Physicists

- Mathematical Methods for Physicists (5th ed). Arfken, Weber
- The Road to Reality. Penrose

1.8.2 Mathematical Modelling

- Modeling and Simulation in Python. Allen B Downey
- A Programmer's Introduction to Mathematics. Jeremy Kun
- Introduction to the Foundations of Applied Mathematics. Holmes
- An Invitation to Applied Mathematics - Differential Equations, Modeling, and Computation. Chicone

1.8.3 Fourier Analysis

- Fourier Analysis with Applications. Filtering, Numerical Computation, Waveletts. Gasquet, Witomski

1.9 Topology and Metric Spaces

1.9.1 Topology

Elements of Abstract Analysis & Set Theory

- Real Analysis with Point-Set Topology
- The Foudnations of Analysis: A Straightforward Introduction - Book 2 Topological Ideas. Binmore
- Elements of Abstract Analysis. Searcoid
- Classic Set Theory. Goldrei

Intro

- Topological Spaces. Buskes, Rooij
- First Concepts of Topology. Chinn, Steenrod
- A Guide to Topology. Krantz
- Introduction to Topology. Mendelson
- A Topological Aperitif. Huggett, Jordan

Core Track

- Introduction to Metric & Topological Spaces. Sutherland
- Topology Through Inquiry. Starbird, Su
- Basic Topology. Armstrong
- Essential Topology. Martin D Crossley

- Topology (2nd ed). Munkres

Metric Spaces

- Metric Spaces. Michael O Searcoid
- Metric Spaces - Iteration and Application. Victor Bryant

Visual, Intuitive, Alternative

- Shape of Space (3rd ed). Jeffrey R Weeks
- Flatland. Edwin Abott
- Intuitive Topology. Prasolov
- Experiments in Topology. Stephen Barr

1.10 Single and Multivariable Calculus

1.10.1 Single Variable Calculus

- A First Course in Calculus. Lang
- Calculus. Spivak
- Calculus in Context. Callahan, Hoffman
- Calculus with Applications. Lax, Shea

long running:

- calculus. Stewart, clegg, watson

1.10.2 Multivariable Calculus

Intro

- Calculus of Several Variables. Serge Lang
- Functions of Two Variables. Sean Dineen

Core Track

- Vector Calculus (6th ed). Marsen, Tromba
- Vector Calculus, Linear Algebra, and Differential Forms - A Unified Approach (5th ed). Hubbard, Hubbard
- Vector Calculus. Matthews
- Advanced Calculus - A Geometric View. Callahan
- An Illustrative Guide to Multivariable and Vector Calculus. Miklavcic
- Multivariable Calculus with Applications. Lax, Terrell
- Multivariate Calculus and Geometry (3rd ed). Sean Dineen
- Calculus and Analysis in the Euclideane Space. Jerry Shurman
- A Course in Multivariable Calculus and Analysis. Ghorpade, Limaye

Mutidomensional Real Analysis

- Multidimensional Real Analysis I - Differentiation. Duistermaat, Kolk
- Multidimensional Real Analysis II - Integration. Duistermaat, Kolk

With CAS

- Multivariable Calculus with MATLAB - With Applications to Geometry and Physics. Lipsman, Rosenberg
- Multivariable Calculus with Mathematica. Shoushani, Gilbert

Advanced Calculus, Math for Physicists

- Advanced Calculus. Kaplan
- Advanced Calculus. R Creighton Buck
- Mathematical Methods for Physics and Engineering. Riley, Hobson, Bence
- Advanced Calculus. Sternberg

1.11 Funcional and Complex Analysis

1.11.1 Complex Analysis

- A First Course in Complex Analysis with Applications. Zill, Shanahan
- Complex Analysis. Howie
- Visual Complex Analysis. Needham

- Complex Analysis. Gamelin
- Complex Analysis. Donald Marshall
- Complex Analysis - A Visual and Interactive Introduction. Juan Carlos Ponce Campuzano

1.11.2 Functional Analysis

- Functional Analysis - An Introduction to Metric Spaces, Hilbert Spaces, and Banach Algebras. Joseph Muscat
- Linear Functional Analysis. Youngson
- Metrics, Norms, Inner Products, and Operator Theory. Christopher Heil
- Introductory Functional Analysis with Applications. Kreyszig
- Theoretical Numerical Analysis - A Functional Analysis Framework (3rd ed). Atkinson, Han
- Introductory Functional Analysis - With Applications to Boundary Value Problems and Finite Elements. Daya Reddy

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1.12 Differential Equations

1.12.1 Intro

- An Introduction to Ordinary Differential Equations. James C Robinson
- Differential Equations (4th ed). Blanchard, Devaney, Hall
- A First Course in Differential Equations - with Modelling Applications. Zill
- Introduction to Differential Equations (3rd ed). Holmes
- Differential Equatins and Linear Algebra (4th ed). Edwards, Penney
- Differential Equations and Linear Algebra. Gilbert Strang
- Differential Equations and Their Applications. Braun
- Ordinary Differential Equations. Adkins, Davidsog
- Ordinary Differential Equations - Applications, Models, and Computing. Charles E Robers Jr

1.12.2 Theory & Qualitative

- Differential Equations, Dynamical Systems, and an Introduction to Chaos. Hirsch, Smale
- The Theory of Differential Equations - Classical and Qualitative. Kelley, Peterson
- Ordinary Differential Equations. Vladimir I Arnold

- Ordinary Differential Equations with Applications. Chicone
- Differential Equations and Dynamical Systems (3rd ed). Lawrence Perko

1.12.3 PDE

- Partial Differential Equations for Scientists and Engineers. Farlow
- Introduction to Partial Differential Equations. Peter J Olver
- Applied Partial Differential Equations (3rd ed). David Logan
- Partial Differential Equations - Analytical Methods and Applications. Henner, Belozerova, Nepomnyaschy

1.13 Dynamical Systems

1.13.1 Intro

- From Calculus to Chaos. D J Acheson
- Introduction to Dynamic Systems - Theory, Models, and Applications. David G Luenberger

1.13.2 Core Track

- Differential Equations, Dynamical Systems, and an Introduction to Chaos (3rd ed). Hirsch, Smale, Devaney
- Chaos - An Introduction to Dynamical Systems. Alligood, Sauer, Yorke
- Dynamical Systems - Differential Equations, maps, and Chaotic Behvaiour. Arrowsmith
- Dynamical Systems with Applications using MATLAB. Stephen Lynch
- Differential Dynamical Systems. James D Meiss

1.13.3 Visual

- Dynamics - The Geometry of Behavior (2nd ed). Abraham, Shaw

1.13.4 Advanced

- Introduction to the Modern Theory of Dynamical Systems. Katok, Hasselblatt

1.13.5 Nonlinear Dynamics & Chaos

- The Essence of Chaos. Lorenzelli
- Chaos and Nonlinear Dynamics - An Introduction for Scientists and Engineers (2nd ed). Robert C Hilborn
- Nonlinear Dynamics and Chaos - With Applications to Physics, Biology, Chemistry, and Engineering. Strogatz
- Chaos in Dynamical Systems. Ott
- Introduction to Applied Nonlinear Dynamical Systems and Chaos (2nd ed). Stephen Wiggins
- Synchronization - A Universal Concept in Nonlinear Science. Pikovsky, Rosenbaum

1.13.6 Discrete Dynamical Systems

- Introdution to Mathematical Modeling Using Discrete Dynamical Systems. Frederick R Morotto
- Introduction to Discrete Dynamical Systems and Chaos. Martelli
- A First Course in Discrete Dynamical Systems. Holmgren
- Discrete Dynamical Systems. Galor
- An Introduction to Difference Equations. Elaydi

1.13.7 Analytical Mechanics

- Introduction to Modern Dynamics. Nolte
- Mechanics. From Newton's Laws to Deterministic Chaos. Florian Scheck
- Physics for Mathematicians - Mechanics I. Spivak
- Advanced Dynamics. Donald T Greenwood
- Analaytical Mechanics. Fasano, Marmi
- Analytical Mechanics. Hand, Finch
- Classical Dynamics - A Contemporary Approach. Jose, Saletan
- Essentials of Hamiltonian Dynamics. Lowenstein
- Lectures on Classical Mechanics. John C Baez
- Mathematical Methods of Classical Mechanics (2nd ed). V I Arnold
- Foundations of Mechanics. Abraham, Marsden
- Geometric Mechanics on Riemannian Manifolds - Applications to Partial Differential Equations. Ovidiu Calin, Der-Chen Chang
- Geometric Mechanics - Toward a Unification of Classical Physics. Talman
- Geometric mechanics and Summetry - From finite to Infinite Dimensions. Darryl Holm, Cristina Stoica
- Advanced Analytical Dynamics. De Sapio

1.14 Differential Geometry & Manifolds, Lie Algebras

1.14.1 Diffgeo Intro

Diffgeo of Curves and Surfaces

- Differential Geometry of Curves and Surfaces. do Carmo
- Differential Geometry of Curves and Surfaces (2nd ed). Banchoff, Lovett
- Elementary Differential Geometry. Andrew Pressley
- Differential Geometry - Curves, Surfaces, Manifolds (2nd ed). Wolfgang Kuehnel

Intro

- Visual Differential Geometry and Forms - A Mathematical Drama in Five Acts. Needham
- Geometry from a Differentiable Viewpoint (2nd ed). John McCleary
- Manifolds, Vector Fields, and Differential Forms - An Introduction to Differential Geometry. Gross, Meinrenken
- First Steps in Differential Geometry - Riemannian, Contact, Symplectic. Andrew McInerney
- Introduction to Differential Geometry. Robbin, Salomon
- A Visual Introduction to Differential Froms and Calculus on Manifolds. Jon Pierre Fortney

Diffgeo of Physics

- Modern Differential Geometry for Physicists (2nd ed). Chris J Isham
- Applied Differential Geometry. William L Burke
- Differential Geometry and Lie Groups for Physicists. Fecko
- Topology, Geometry, and Gauge Fields - Foundations (2nd ed). Gregory L Naber
- The Geometry of Physics - An Introduction. Theodore Frankel
-

1.14.2 Riemannian Geometry

- Riemannian Geometry. do Carmo
- Riemannian Geometry (3rd ed). Gallot, Hulin, Lafontaine

1.14.3 Manifolds

- An Introduction to Multivariable Analysis - from Vector to Manifold. Mikusinski, Taylor
- An Introdution to Manifolds. Spivak
- An Introduction to Manifolds. Lowing W Tu
- Differentiable Manifolds (2nd ed). Lawrence Conlon
- An Introduction to Differential Manifolds. Jacques Lafontaine

Advanced

- Introduction to Smooth Manifolds (2nd ed). John M Lee
- Introduction to Topological Manifolds. John M Lee
- Analysis on Manifolds. Munkres

1.14.4 Lie Algebras

- Naive Lie Theory. Stillwell
- Lie Groups and Algebras with Applications to Physics, Geometry, and Mechanics. Sattinger, Weaver
- Foundations of Differentialbe Manifolds and Lie Groups. Frank W Warner
- Lie Groups, Physics, and Geometry - An Introduction to Physicists, Engineers and Chemists. Robert Gilmore
- Lie Groups, Lie Algebras, and Representations - An Elementary Introduction. Brian C Hall
- Lie Groups, an Approach Through Invariants adn Representations. Claudio Procesi
- Continious Symmetries, Lie Algebras, Differential Equations, and Computer Algebra. Steeb Willihans

1.15 Numerical Methods

1.15.1 Intro with Matlab

- Numerical Analysis (3rd ed). Timothy Sauer
- Elementary Numerical Analysis (3rd ed). Atkinson, Han
- Scientific Computing with MATLAB and Octave (4th ed). Quarteroni, Gervasio
- Scientific Computing - An Introduction using MAPlE and MATLAB. Gander, Gander, Kwok
- Exercises in Computational Mathematics with MATLAB. Lyche, Merrien

1.15.2 Intro with Python

- Numerical Methods in Engineering with Python 3. Jaan Kiusalaas
- Einfuehrung in die Numerik. Scheichl & Friess
- Einfuehrung in die Numerik. Zech

1.15.3 Older Ref

- Introduction to Applied Numerical Analysis. Hamming

1.16 Probability and Statistics

1.16.1 Probability

Core Track

- Probability - An Introduction with Statistical Applications (2nd ed). John J Kinney
- Introduction to Probability (2nd ed). Blitzstein, Hwang
- Introduction to Probability. Anderson, Seppalainen, Valko
- A Course in Probability (10th ed). Sheldon Ross
- Probability with Applications in Engineering, Science, and Technology (2nd ed). Carlton, Devore
- Introduction to Probability for Data Science. Stanley H Chan
- Probability. Jim Pitman

Conceptual, Models, Problems

- Understanding Probability. Tijms
- Introduction to Probability Models (11th ed). Sheldon Ross
- Probability Models (2nd ed). John Haigh

Problem Book Specific

- Problems and Snapshots from the World of Probability. Blom, Holst, Sandell
- 40 Puzzles and Problems in Probability and Mathematical Statistics. Schwartz
- Exercises in Probability. Cacoullos
- The Pleasures of Probability. Richard Isaac

Proabibility of Games Specific

- Games, Gambling, and Probability - An Introduction to Mathematics (2nd ed). David G Taylor
- The Mathematics of Games and Gambling. Edward W Packel

Historical

- Chance and Choice by Cardpack and Chessboard - An Introduction to Probability in Practice by Visual Aids. Lancelot Hogben
- Statistical Theory - The Relationship of Probability, Credibility and Error. Lancelot Hogben

Multivariate Analysis & Lina for Statistics

- Methods of Multivariate Analysis (3rd ed). Rencher, Christensen
- Linear Algebra and Matrix Analysis for Statistics. Banerjee, Roy
- Matrix Algebra From a Statistician's Perspective. Harville
- Matrix Algebra Useful for Statistics (2nd ed). Searle, Khuri

1.16.2 Statistics

Introductory

- Probability and Statistics for Science & Engineering - with Examples in R. Hongshik Ahn
- Introductory Statistics. Sheldon Ross
- Discovering Statistics Using R. Field, Miles, Field
- Modern Elementary Statistics (12th ed). Freund, Perles

Core Track

- Probability and Statistics with R for Engineers and Scientists. Akritas
- Introduction to Probability and Statistics for Engineers and Scientists (6th ed). Sheldon M Ross
- Probability and Statistics - for Engineering and the Sciences (9th ed). Devore
- Probability and Statistics (4th ed). DeGroot, Schervish
- Statistics (4th ed). Freedman, Pisani, Purves

Mathmetical Statistics

- An Introduction to Mathematical Statistics and Its Applications (5th ed). Larsen, Marx
- Modern Mathematical Statistics with Applications (3rd ed). Devore, Berk, Carlton
- Mathematical Statistics and Data Analysis. Rice
- Introduction to Mathematical Statistics. Hogg, McKean, Craig

Data Science

- Modern Data Science with R (2nd ed). Baumer, Kaplan, Horton
- Modern Statisticsg with R - From Wrangling and Exploring Data to Inference and Predictive Modelling (2nd ed). Thulin
- The Data Science Design Manual. Steven S Skiena
- A Tour of Data Science - Learn Pytnon and R in Parallel. Zhang
- Data Science Using Python and R. Larose
- Intro to Python for Computer Science and Data Science. Deitel, Deitel
- R for Data Science - Import, Tidy, Transform, Visualize and Model Data. Wickham, Cetinkaya-Rundel, Grolemund
- Practical Data Science with R. Zumel, Mount

Older Books

- Statistics for Technology - A Course in Applied Statistics (1978). Chatfield
- Statistics for biologists. Finney
- The Computation of Style. Kenny
- Elementary Statistical Methods. Wetherill