

# Pensum

Følgende deler av læreboka er pensum:

- ▶ 1.1–1.5
- ▶ kapitlene 2–8
- ▶ 15.1–15.5 (Picarditerasjon (nederst s.15-5 til s. 15-7) er kursorisk)
- ▶ appendiks A.2

I tillegg er øvingene og følgende notater pensum:

- ▶ Induksjonsprinsippet - med noen eksempler
- ▶ Polynomdivisjon
- ▶ Kurvedrøfting

# Kapittel 1, Functions

- 1.1 Functions and Their Graphs
- 1.2 Combining Functions; Shifting and Scaling Graphs
- 1.3 Trigonometric Functions
- 1.4 Exponential Functions
- 1.5 Inverse Functions and Logarithms

# Kapittel 2, Limits and Continuity

- 2.1 Rates of Change and Tangents to Curves
- 2.2 Limit of a Function and Limit Laws
- 2.3 The precise Definition of a Limit
- 2.4 One-Sided Limits and Limits at Infinity
- 2.5 Infinite Limits and Vertical Asymptotes
- 2.6 Continuity
- 2.7 Tangents and Derivatives at a Point

# Kapittel 3, Differentiation

- 3.1 The Derivative as a Function
- 3.2 Differentiation Rules for Polynomials, Exponentials, Products, and Quotients
- 3.3 The Derivative as a Rate of Change
- 3.4 Derivatives of Trigonometric Functions
- 3.5 The Chain Rule and Parametric Equations
- 3.6 Implicit Differentiation
- 3.7 Derivatives of Inverse Functions and Logarithms
- 3.8 Inverse Trigonometric Functions
- 3.9 Related Rates
- 3.10 Linearization and Differentials
- 3.11 Hyperbolic Functions

# Kapittel 4, Applications of Derivatives

- 4.1 Extreme Values of Functions
- 4.2 The Mean Value Theorem
- 4.3 Monotonic Functions and the First Derivative Test
- 4.4 Concavity and Curve Sketching
- 4.5 Applied Optimization
- 4.6 Newton's Method
- 4.7 Antiderivatives

# Kapittel 5, Integration

- 5.1 Estimating with Finite Sums
- 5.2 Sigma Notation and Limits of Finite Sums
- 5.3 The Definite Integral
- 5.4 The Fundamental Theorem of Calculus
- 5.5 Indefinite Integrals and the Substitution Rule
- 5.6 Substitution and Area Between Curves
- 5.7 The Logarithm Defined as an Integral

# Kapittel 6, Applications of Definite Integrals

- 6.1 Volumes by Slicing and Rotation About an Axis
- 6.2 Volumes by Cylindrical Shells
- 6.3 Lengths of Plane Curves
- 6.4 Areas of Surfaces of Revolution
- 6.5 Exponential Change and Separable Differential Equations
- 6.6 Work
- 6.7 Moments and Centers of Mass

# Kapittel 7, Techniques of Integration

7.1 Integration by Parts

7.2 Trigonometric integrals

7.3 Trigonometric Substitutions

7.4 Integration of Rational Functions by Partial Fractions

7.5 Integral Tables and Computer Algebra Systems

7.6 Numerical Integration

7.7 Improper Integrals



# Kapittel 8, Infinite Sequences and Series

- 8.1 Sequences
- 8.2 Infinite Series
- 8.3 The Integral Test
- 8.4 Comparison Tests
- 8.5 The Ration and Root Tests
- 8.6 Alternating Series, Absolute and Conditional Convergence
- 8.7 Power Series
- 8.8 Taylor and Maclaurin Series
- 8.9 Convergence of Taylor Series
- 8.10 The Binomial Series

# Kapittel 15, First-Order Differential Equations

15.1 Solutions, Slope Fields, and Picard's Theorem

15.2 First-Order Linear Equations

15.3 Applications

15.4 Euler's Method

15.5 Graphical Solutions of Autonomous Equations

# Appendiks og Notater

## A.2 Mathematical Induction

- ▶ Induksjonsprinsippet - med noen eksempler
- ▶ Polynomdivisjon
- ▶ Kurvedrøfting

# Taylor's formel

## Teorem (side 560 i boken)

La  $N \in \mathbb{N}_0$ , la  $I$  være et åpen interval, la  $a \in I$ , og la  $f(x)$  være en funksjon slik at  $f(x)$  og dens  $N + 1$  første deriverte eksisterer og er kontinuerlige på  $I$ . Da gjelder for alle  $x \in I$  at

$$f(x) = \sum_{n=0}^N \frac{f^{(n)}(a)}{n!} (x - a)^n + R_N(x)$$

hvor  $R_N(x) = \frac{f^{(N+1)}(c)}{(N+1)!} (x - a)^{N+1}$  for et tall  $c$  som tilhører intervallet mellom  $a$  og  $x$ .