MA172: Calculus II

Baker University — Spring 2023

Exam 1 — Integration: Techniques and Strategies

Wednesday, 25 January 2023

- Calculus I review
    - ⋄ limits
    - ⋄ continuity

Friday, 27 January 2023

- Calculus I review
    - ⋄ differentiation
    - ⋄ L'Hôpital's Rule

Monday, 30 January 2023

- Calculus I review
    - ⋄ implicit differentiation
    - ⋄ exponential and logarithmic functions
    - ⋄ inverse trigonometric functions

Tuesday, 31 January 2023

- Calculus I review handout
    - ⋄ limits, continuity, differentiation, and L'Hôpital's Rule
    - ⋄ implicit differentiation
    - ⋄ exponential and logarithmic functions
    - ⋄ inverse trigonometric functions
- syllabus quiz

Wednesday, 1 February 2023

- antidifferentiation
    - ⋄ Power Rule for Antidifferentiation
    - ⋄ Chain Rule for Antidifferentiation

- - ◇ linearity of the antiderivative
  - ◇ antiderivatives of common functions
- ordinary differential equations
  - ◇ initial value problems
  - ◇ rectilinear motion

Friday, 3 February 2023

- area under curves of one variable
  - ◇ sigma notation
  - ◇ properties of finite sums

Monday, 6 February 2023

- area under curves of one variable
  - ◇ Riemann sums and sigma notation
  - ◇ left-hand, right-hand, and midpoint approximations
  - ◇ limit definition

Tuesday, 7 February 2023

- definite integration
  - ◇ limit definition of a definite integral
  - ◇ geometric approach to definite integration
- antidifferentiation handout
  - ◇ trigonometric functions
  - ◇ exponential and logarithmic functions
  - ◇ inverse trigonometric functions

Wednesday, 8 February 2023

- definite integration
  - ◇ properties of definite integrals
  - ◇ computing some definite integrals

Friday, 10 February 2023

- the Fundamental Theorem of Calculus
  - ◇ the Fundamental Theorem of Calculus, Part I (or the Evaluation Theorem)
  - ◇ the Net Change Theorem and its applications

Monday, 13 February 2023

- the Fundamental Theorem of Calculus

  ◇ the Fundamental Theorem of Calculus, Part II

  ◇ differentiation and integration as inverse processes

Tuesday, 14 February 2023

- u-substitution

  ◇ applications to definite and indefinite integrals

  ◇ applications to symmetric functions

Wednesday, 15 February 2023

- integration by parts

  ◇ applications to definite and indefinite integrals

  ◇ strategies for employing integration by parts (LIATE)

Friday, 17 February 2023

- trigonometric integration

  ◇ integration by Power Reduction Formulas

  ◇ integration by u-substitution

  ◇ integration by parts

  ◇ applications to definite and indefinite integrals

  ◇ strategies for trigonometric integration

Monday, 20 February 2023

- trigonometric integration

  ◇ strategies for trigonometric integration

  ◇ applications to definite and indefinite integrals

Tuesday, 21 February 2023

- trigonometric substitution

  ◇ the Pythagorean Theorem and the Pythagorean Identities

  ◇ applications to definite and indefinite integrals

Wednesday, 22 February 2023

- partial fraction decomposition

  ◇ polynomial long division

  ◇ the method of undetermined coefficients

      ⋄ strategies for employing a partial fraction decomposition

      ⋄ applications to definite and indefinite integrals

Friday, 24 February 2023

- improper integration

      ⋄ improper integrals over unbounded regions

      ⋄ improper integrals with discontinuous integrands

      ⋄ comparison theorems for improper integrals

Monday, 27 February 2023

- Exam I review

Tuesday, 28 February 2023

- Exam I

Exam 2 — Integration: Applications and Modeling

Wednesday, 1 March 2023

- area bounded by two curves

      ⋄ horizontally or vertically simple regions

      ⋄ non-simple regions

Friday, 3 March 2023

- the Disk and Washer Method

Monday, 6 March 2023

- the Shell Method

Tuesday, 7 March 2023

- strategies for finding volumes of solids of revolution

Wednesday, 8 March 2023

- work

      ⋄ definition of work as a definite integral

      ⋄ work done on a spring

      ⋄ work done to lift a chain

      ⋄ work done to empty a tank

Friday, 10 March 2023

- arc length

⋄ the arc length formula

⋄ the arc length function

Monday, 20 March 2023

- parametric equations

  ⋄ function notation in parametric form

  ⋄ common functions in parametric form

  ⋄ converting between Cartesian and parametric forms

Tuesday, 21 March 2023

- parametric equations

  ⋄ derivatives of parametric curves

  ⋄ integrals of parametric curves

  ⋄ arc length of parametric curves

Wednesday, 22 March 2023

- polar coordinates

  ⋄ converting between Cartesian and polar coordinates

  ⋄ common functions in polar form

Friday, 24 March 2023

- polar coordinates

  ⋄ integration in polar coordinates

  ⋄ arc length of polar functions

Monday, 27 March 2023

- Exam II review

Tuesday, 28 March 2023

- Exam II

Exam 3 — Sequences and Series

Wednesday, 29 March 2023

- sequences

  ⋄ closed-form expressions of sequences

  ⋄ convergence and divergence of sequences

Friday, 31 March 2023

- sequences

    ◇ properties of convergent sequences

    ◇ the Squeeze Theorem

    ◇ the Monotone Convergence Theorem

Monday, 3 April 2023

- series

    ◇ basic properties of convergent series

    ◇ geometric and harmonic series

    ◇ the Divergence Test for Series

Tuesday, 4 April 2023

- the Integral Test for Series

- convergence of p-series

- sequences and series handout

    ◇ closed-form expressions of sequences

    ◇ convergence and divergence of sequences

    ◇ geometric and harmonic series

Wednesday, 5 April 2023

- the Direct Comparison Test for Series

- the Limit Comparison Test for Series

Monday, 10 April 2023

- the Alternating Series Test

- the Alternating Series Estimation Theorem

- absolute and conditional convergence

Tuesday, 11 April 2023

- the Ratio Test for Series

- the Root Test for Series

Wednesday, 12 April 2023

- power series

    ◇ the radius of convergence of a power series

- ⋄ the interval of convergence of a power series

Friday, 14 April 2023

- representations of functions as power series

    - ⋄ geometric series

    - ⋄ differentiation and integration of power series

Monday, 17 April 2023

- Taylor series

- Maclaurin series

Tuesday, 18 April 2023

- series review

    - ⋄ convergence and divergence of series

    - ⋄ representations of functions as power series

- strategies for computing series handout

Friday, 21 April 2023

- Taylor polynomials

    - ⋄ approximation of functions using Taylor polynomials

    - ⋄ approximation of definite integrals using Taylor polynomials

    - ⋄ Taylor's Theorem and error approximation

Monday, 24 April 2023

- probability

    - ⋄ discrete probability distributions

    - ⋄ discrete probability density functions

    - ⋄ expected value of discrete random variables

Tuesday, 25 April 2023

- probability

    - ⋄ continuous probability distributions

    - ⋄ continuous probability density functions

    - ⋄ expected value of continuous random variables

Wednesday, 26 April 2023

- further applications of series

    - ⋄ the Basel Problem

         ⋄ Euler's Identity

Friday, 28 April 2023

- further applications of series

    ⋄ generating functions in combinatorics

    ⋄ Hilbert series in commutative algebra

Monday, 1 May 2023

- Exam III review

Tuesday, 2 May 2023

- **Exam III**

Wednesday, 3 May 2023

- Final Exam review

Friday, 5 May 2023

- Final Exam review

Monday, 8 May 2023

- Final Exam review

Tuesday, 9 May 2023

- Final Exam review

Wednesday, 10 May 2023

- Final Exam review

Friday, 12 May 2023

- Final Exam review

Wednesday, 17 May 2023

- **Final Exam, 8:30 to 11:30 AM; Mulvane 211**