2DM10 Studeerwijzer 2010–2011

Algemene Informatie

Assistenten begeleide zelfstudie 2DM10 2010-2011:

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Zaalindeling begeleide zelfstudie 2DM10 2010-2011:

- HG 6.96 (zaalcapaciteit ca. 36): Rik Kaasschieter & Bas Willems
- HG 6.09 (zaalcapaciteit ca. 48): Adrian Muntean & Arris Tijsseling & Rozemarijn Weijers

Verantwoordelijk docent 2DM10 2010-2011:

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Boek: *Calculus: A Complete Course*, Robert Adams & Christopher Essex, 7de editie © 2010

Studeerwijzer

- W = werkcollege, C = college, BZ = begeleide zelfstudie
- BZ exercises requiring a calculator or Matlab may be ignored
- this not necessarily complete information is provided for your convenience, no rights can be inferred from it

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- **W 9–11–2010:** $\mathbb{C}$-numbers, Appendix I
- **C 10–11–2010:** $\mathbb{C}$-functions, Appendix II
  - $\mathbb{C}$-functions in general and graphical representation
  - $\mathbb{C}$-polynomials
- **BZ 11–11–2010:** odd exercises Appendix I

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- **W 16–11–2010:** $\mathbb{C}$-functions, Appendix II:
  - algebraic manipulation of $\mathbb{C}$-polynomials
  - fundamental theorem of algebra (without proof)
  - definition and graphical representation $\mathbb{C}$-exponential function
- **C 17–11–2010:** differentiation, chapter 2 (refreshment of 2DM00: "basis wiskunde")
  - standard functions and their derivatives, pp. 101–124
  - general differentiation rules, pp. 107–118
  - mathematical induction ("volledige inductie"), p. 109
- **BZ 18–11–2010:** odd exercises 2.3, p. 114 & 2.4, p. 119 & 2.5, pp. 124–125

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- **W 23–11–2010:**
  - mean value theorem and corollaries, pp. 136–142
- **C 24–11–2010:**
  - linear approximations, pp. 266–271
  - Taylor polynomials, pp. 271–279

- **BZ 25–11–2010:** odd exercises 2.8, p. 142 & 4.9, p. 271 & 4.10, pp. 279–280

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- **W 30–11–2010:**
  - *proof of Taylor's theorem*, pp. 271–275
  - big-$\mathcal{O}$ notation, pp. 276–279
  - Taylor formulas for standard functions, p. 277
  - Σ-notation, pp. 288–292
  - partitions, upper and lower Riemann sums, definite integral, pp. 299–302
- **C 1–12–2010:**
  - general Riemann sums, pp. 303–304
  - properties of definite integral, pp. 305–307
  - mean value theorem for definite integral, pp. 308–309
  - fundamental theorem of calculus, pp. 311–315
- **BZ 2–12–2010:**
  - odd exercises Appendix II, p. A-19 (except 19, 21)
  - odd exercises 4.10, pp. 279–280
  - exercises 5.1: 11, 13, 33, 35–38 (prove formulas 35–38 via mathematical induction)
  - odd exercises 5.5 up to 45

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- **W 7–12–2010:**
  - method of substitution, pp. 316–322
- **C 8–12–2010:**
  - integration by parts, pp. 331–336
- **BZ 9–12–2010:**
  - exercises 5.6, pp. 323–324: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 33, 41, 43
    - hint 11: rewrite in terms of $\cosh x$ and $\sinh x$ and recall $\cosh' x = \sinh x$, $\sinh' x = \cosh x$
    - hint 19: $y = \ln \cos x$ (it is assumed that x is such that $\cos x > 0$)
    - hint 21: $x^2 + 6x + 13 = 4((\frac{1}{2}x + \frac{3}{2})^2 + 1)$
  - exercises 6.1, pp. 336–337: 1, 3, 5, 7, 13, 19, 21, 37
    - hint 7: $\arctan x = 1 \cdot \arctan x$ (b.t.w. $\tan^{-1} = \arctan$)

    * hint 13: perform integration by parts twice
    * hint 19: $\cos(\ln x) = 1 \cdot \cos(\ln x)$ (it is assumed that $x > 0$)
    * hint 21: substitution of variables and integration by parts are both applicable: try!

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- **W 14–12–2010:**
  - standard limits: $\lim_{x\to\infty} x^n e^{-x} = \lim_{x\to\pm\infty} x^n e^{-x^2} = \lim_{x\to 0} x^{n+1} \ln|x| = 0$ for $n \geq 0$
  - integral of a rational function, pp. 337–345
  - classification of ordinary differential equations (ODEs):
    * n^{th} order linear (in)homogeneous ODEs with (non)constant coefficients
    * 1^{st} order (non)linear separable ODEs
- **C 15–12–2010:**
  - section 2.10, pp. 147–152
  - section 3.7, pp. 203–209 (especially cases I, II, and III)
  - section 7.9, pp. 445–453 (separable ODEs only)
  - section 17.1, pp. 938–940 (especially Theorem 1 and Theorem 2)
- **BZ 16–12–2010:**
  - exercises 2.10, p. 153: 27–45 (odd numbered only), 44
  - exercises 3.7, pp. 209–210: 13, 14, 15, 19, 21
  - exercises 7.9, pp. 452–453: 1, 3, 5, 7, 9, 13, 15, 17

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- **W 4–1–2011:**
  - section 17.5, pp. 957–961 (2^{nd} order only except Euler equations)
  - section 17.6, pp. 961–967 (only the method of "educated guessing" or "undetermined coefficients" for constructing particular solutions)
- **C 5–2–2011:**
  - section 7.9, pp. 445–453 (first order linear ODEs only)
  - section 17.5, pp. 957–961 (higher order only except Euler equations)
  - typical examination examples
- **BZ 6–1–2011:**
  - exercises 17.1, pp. 940–941: 1, 3, 5, 7, 9, 11, 17

- exercises 17.5, p. 961: 1, 3, 5
- exercises 17.6, pp. 967–968: 1, 3, 5, 7, 9
  - hint 1: stipulate a particular solution of the form $y_{\mathrm{p}}(x) = ax + b$
  - hint 3: stipulate a particular solution of the form $y_{\mathrm{p}}(x) = ae^{bx}$
  - hint 5: stipulate a particular solution of the form $y_{\mathrm{p}}(x) = ax^2 + bx + c$
  - hint 7: stipulate a particular solution of the form $y_{\mathrm{p}}(x) = (ax + b)e^{cx}$
  - hint 9: stipulate a particular solution of the form $y_{\mathrm{p}}(x) = (a \sin x + b \cos x)e^{cx}$

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- **Exams January 19 & April 13, 2011:**
  - all theory and exercises outlined above, except subjects in *italics*
  - all theory and examples covered in the oral lectures
  - those parts of "*Calculus: A Complete Course*" relating to the above
  - only pen and paper are allowed, i.e. no calculator, laptop, notes or other material
  - it is strongly recommended to practice with old exams in addition