Mathematics 373 Numerical Analysis Spring 2004

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Office Hours Hill 546 Thursday 1;30 – 2:30 or by appointment

Web page www.math.rutgers.edu/courses/373/

Course Text *Numerical Analysis*, R. Burden and J. Faires, Seventh edition, Brooks/Cole, 1997 (841 pp.); (ISBN 0-534-38216-9)

Week 1 Bisection Method and Fixed Point Iteration
Sections 2.1, 2.2

Exercises page 53—3, 7a, 12, 17
64—4, 8, 11b, 14, 23

Week 2 Newton's Method and Convergence
Sections 2.3, 2.4

Exercises page 75—5b, 14, 20, 23
85—4, 6, 9

Week 3 Accelerating convergence and roots of polynomials
Sections 2.5, 2.6

Exercises page 90—1c, 8, 11, 12
99—1a, 2a, 4a, 5b, 10

Week 4 Interpolating polynomials and divided differences
Sections 3.1, 3.2

Exercises page 119—3c, 5, 7c, 29
131—4, 5, 14

Week 5 Hermite interpolation and splines
Sections 3.3, 3.4

Exercises page 139—1a, 2a, 4, 7
152—3a, 4a, 5a, 11, 24

Week 6 Bezier curves
Sections 3.5

Exercises page 162—1a, 4, 5

Midterm Exam March 4 — covering fixed point methods, root finding, polynomial approximation, and interpolation.

Week 7 Numerical Differentiation
Sections 4.1, 4.2

Exercises page 175—1b, 2b, 19, 20
184—1d, 15

Week 8 Numerical Integration
Sections 4.3, 4.4

Exercises page 195—1e, 2e, 3e, 5e, 16
203—1f, 2f, 7, 18

Week 9 Romberg Integration, Adaptive and Gaussian Quadrature
Sections 4.5, 4.6, 4.7

Exercises page 211—1b, 3b,
219—1f, 2f, 5
226—1f, 2f, 5

Week 10 Differential equations and Euler's method
Sections 5.1, 5.2

Exercises page 255—1a, 2c, 6a
263—1b, 2b, 5

Week 11 Higher order Taylor and Runge-Kutta methods
Sections 5.3, 5.4

Exercises page 271—1c, 2c, 5, 7
280—1c, 2c, 3c, 10c, 14

Week 12 Multistep methods, variable step-sizes and extrapolation
Sections 5.5, 5.6, 5.7, 5.8

Exercises page 287—1c
300—1d
306—1d, 5
312—1d

Week 13 Systems of equations, stability and stiff systems
Sections 5.9, 5.10, 5.11

Exercises page 322—1a, 6
333—5
340—1b, 5

Final Exam on Friday, May 7, 12:00 to 3:00 P.M. in SEC–206