

Lecture Sessions 151A Applied Numerical Methods, Spring 2012

Session	Week	Day	Date	Book Section		Topics	due	
1	1	M	April 2, 2012	1.1	Math. Prel. and Error Analysis	General course overview, repeating some calculus including Taylor series.		
2		W	April 4, 2012	1.2		Computer representation of numbers. Limitations imposed by integer representation.		
3		F	April 6, 2012	1.2		Limitations imposed by floating point representation. Unit roundoff.	HW 1	
4	2	M	April 9, 2012	1.2,1.3	Solution of Equations in One Variable	Errors in floating point arithmetic computations; catastrophic cancellation. algorithms and convergence.		
5		W	April 11, 2012	2.1		The bisection method.		
6	F	April 13, 2012	2.1	Convergence estimates for the bisection method. Errors and residuals.		HW 2		
7	3	M	April 16, 2012	2.2		Fixed-point iteration.		
8		W	April 18, 2012	2.3		The Newton-Raphson method.		
9		F	April 20, 2012	2.3		The secant method.	HW 3	
10	4	M	April 23, 2012	2.4		Error analysis for Newton-Raphson and the secant method. Rates of convergence.		
11		W	April 25, 2012	2.4		Comparison of iterative methods. Convergence properties of Newton and Secant Method		
12		F	April 27, 2012	2.4		Modified Newton method	HW 4	
13	5	M	April 30, 2012				MIDTERM EXAM in class	
14		W	May 2, 2012	3.1		Interpolation and Polynomial Approximation	Polynomial interpolation and Lagrange interpolation	
15		F	May 4, 2012	3.1			Lagrange interpolation. Existence and uniqueness.	HW 5
16	M	May 7, 2012	3.1	Lagrange interpolation. Error estimates.				
17	6	W	May 9, 2012	3.2	Recursive Lagrange polynomial generation, Aitken and Neville			
18		F	May 11, 2012	3.3	Newton divided differences	HW 5		
19	7	M	May 14, 2012	4.1, 4.2	Numerical Differentiation and Integration	Numerical Differentiation, Richardson Extrapolation		
20		W	May 16, 2012	4.2, 4.3		Richardson Extrapolation. Newton Cotes.		
21		F	May 18, 2012	4.3, 4.4		Numerical Integration. Newton-Cotes formulas. Composite integration formulas.	HW 6	
22	8	M	May 21, 2012	4.3, 4.4	Numerical integration error estimates. (Aitken estimation of rates of convergence.)			
23		W	May 23, 2012	4.7	Gaussian quadrature. Derivation of 2 and 3 point formulas.			
24		F	May 25, 2012	6.1	Direct Methods for Solving Linear Systems	Numerical linear algebra. Solving linear systems of equations. Review of Gaussian elimination.	HW 7	
-	9	M	May 28, 2012			MEMORIAL DAY HOLIDAY		
25		W	May 30, 2012	6.5		Equivalence of Gaussian elimination and LU factorization.		
26		F	June 1, 2012	6.2		Construction of the LU factorization. Pivoting. Use of the LU factorization.	HW 8	
27	10	M	June 4, 2012	6.1	Operations counts for Gaussian elimination. LU factorization.			
28		W	June 6, 2012	6.6	Special types of matrices. Band solvers, Choleski factorization			
29		F	June 8, 2012	Review	Review			
30	11	R	June 14, 2012			EXAM		