

SM212/212P DIFFERENTIAL EQUATIONS

Spring Semester 2007

Textbook: Differential Equations, 6th edition, by D. Zill and M. Cullen.

Remarks:

- (a) Section 4.5 may be substituted by Section 4.4; this is your instructor's choice.
- (b) For Section 12.3 please refer to the notes available on the course web site:

<http://www.usna.edu/Users/math/liakos/Sm212-Spring2007.htm>

This site will be operational after January 8, 2007.

	Section(s)	Title/Note	Problems
1	1.1	Definitions and Terminology	2,5,9,12,19,21,27
2	1.2	Initial-Value Problems	4,9,12,15,18,30
3	2.1	Solution curves without solution	1,4,13,14,15,19
4	2.2	Separable Variables	1,6,8,17,20
5	2.3	Linear Equations	3,10,16,23,27,28
6	2.6 & 9.1	Euler's and Improved Euler's Method	pg. 84: 1,4 pg. 372: 1,6
7	3.1	Linear Models - Growth/Decay & Cooling/Warming	3,8,11,13,15
8		Linear Models - Mixtures / Circuits	19,21,23,27,29,31
9		REVIEW	
10		TEST 1	
11	4.1	Linear D.E.s : Basic Theory <i>I.V.P. & B.V.P., Homogeneous Equations Part I</i>	3,5,7,10,13(a),(b)
12		Linear D.E.s : Basic Theory <i>Homogeneous Eq. Part II, Nonhomogeneous Eq.</i>	15,18,26,31,35
13	4.3	Homogeneous Linear Eqs. with Constant Coefficients <i>Distinct & Repeated Real Roots</i>	3,6,9,17,33
14	4.3 & 4.5*	Hom. Lin. Eqs. II & Undetermined Coeffs - Annihilators <i>Complex Roots & Annihilators of x^k</i>	pg. 166: 2,8,15,27,36,40
15	4.5*	Undetermined Coefficients - Annihilator Approach <i>Annihilators of $x^k e^{\alpha x}$</i>	18,24,28,43,46
16		Undetermined Coefficients - Annihilator Approach <i>Annihilators of $x^k e^{\alpha x} \cos \beta x$</i>	20,26,32,53,56
17		REVIEW	
18	5.1	Linear Models: Initial Value Problems <i>Free Undamped</i>	2,3,4,8,12
19		Linear Models: Initial Value Problems <i>Damped Motion</i>	17,18,22,25

	Section(s)	Title/Note	Problems
20		Linear Models: Initial Value Problems <i>Driven Motion with Damping</i>	30,33,39 39(b): l' Hospital
21		Linear Models: Initial Value Problems <i>Series Circuit Analog</i>	52,53,56
22		REVIEW	
23		TEST 2	
24	7.1	Definition of the Laplace Transform <i>Definition 7.2 & Theorems 7.2,7.3 not covered</i>	7,11,25,30,41
25	7.2	Inverse Trans. & Trans. of Derivatives <i>Definition & Partial fractions</i>	5,15,23,27
26		Inverse Trans. & Trans. of Derivatives <i>Transform of Deriv. & Solution of O.D.E.s</i>	33,37
27	7.3	Operational Properties I <i>Translation on the s-Axis</i>	10,18,21,29
28		Operational Properties I <i>Unit-Step Functions & Translation on the t-Axis</i>	41,44,49,50,51,52,66
29		REVIEW	
30	7.4	Operational Properties II <i>Derivatives of Transforms & Convolutions</i>	6,11,17,20,25
31		Operational Properties II <i>Convolutions & Periodic Functions</i>	38,47,50,51,56
32	7.5	The Dirac Delta Function	3,12
33		REVIEW	
34		REVIEW	
35	App. II	Introduction to Matrices <i>Section II.1</i>	1,3,4,6,25,26,27
36		Introduction to Matrices <i>Section II.2 - Exclude Theorem II.2</i>	31,33,39
37		Introduction to Matrices <i>Sections II.2 & II.3</i>	47,49,51,53
38		Introduction to Matrices <i>Section II.3 - Exclude Theorem II.3</i>	54,55,56
39		REVIEW	
40		TEST 3	
41	8.1	Preliminary Theory	1,11,13,17,23
42	8.2	Homogeneous Linear Systems <i>Distinct real eigenvalues, Subsection 8.2.1</i>	2,4,6
43		Homogeneous Linear Systems <i>Repeated real eigenvalues, Subsection 8.2.2</i>	19,21
44		Homogeneous Linear Systems <i>Distinct complex eigenvalues, Subsection 8.2.3</i>	33,34,37,38

	Section(s)	Title/Note	Problems
45	9.4	Higher-Order Equations & Systems <i>Reduction to 1st order systems & Euler's Method</i>	1,2
46	3.3	Modeling with Systems of DEs <i>Mixtures and Networks only</i>	6,8,12,13
47	7.6	Systems of Linear DEs <i>Networks only</i>	16,20
48		REVIEW	
49	12.1	Separable Partial Differential Equations <i>Separation of Variables ONLY</i>	
50	12.3	Heat Equation <i>Solution of BVP and necessity of Fourier Series Cover up to equation (13)</i>	See Notes
51	11.1	Orthogonal Functions <i>Definitions 11.1-11.3, Show orthogonality of $\{\cos nx\}$ and $\{\sin nx\}$ in $[-\pi, \pi]$.</i>	
52	11.2	Fourier Series	1,3,10,13
53		Fourier Series	5,7,17,19
54	11.3	Fourier Cosine and Sine Series <i>All material up to and including Example 3(a),(b) but NOT (c).</i>	27,28,29,33
55	12.3	Heat Equation <i>Zero ends, see notes in the course web-site.</i>	See Notes
56		Heat Equation <i>Insulated ends, see notes in the course web-site.</i>	See Notes
57		REVIEW	
58		TEST 4	
59		REVIEW FOR FINAL	

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