Course content by week

George McNinch

week 1 - Introduction to ODEs

- §1.1: 1st-order eqs and §1.2: Separ. of vars
  - §1.1 (p.8): 1,3,7,13,17
  - §1.2 (p.16): 3,5,15,17)
- §1.3: 1st Order Lin ODEs
  - §1.3 (p.25): 1,3,7,8,12,19,23)
- §1.6: Exist. and Uniq.
  - §1.6 (p.56): 1,3,6,11,12

week 2 - Examples and tools for ODEs

- §2.1: Spring Models and §2.2: Linear ODEs
  - §2.1 (p.92): 5
  - §2.2 (p.102): 1,2,3,4,7,9,11,12,16,17
- App. A: Determinants
  - App. A (p.194): 1,3,4,6,11,22,24,25
- §2.3: Wronskian & sols
  - §2.3 (p.113): 1,3,5,8,13,19,26

week 3 - Constant coefficient linear ODEs

- §2.4: Lin indep of funcs
  - §2.4 (p.120): 2,5,9,13,19
- §2.5: const coeff Lin ODEs (real roots)
  - §2.5 (p.129): 3,5,9,10,14,22,24
- §2.6: const coeff Lin ODEs (complex roots)
  - §2.6 (p.136): 1,5,11,14,16,19,20,23

week 4 - Inhomogeneous equations

- §2.7: Undetermined Coeffs
  - §2.7 (p.145): 1,2,3,4,11,14,15
- §2.8: Var of Params
  - §2.8 (p.155): 1,3,7,9,14,18

week 5 - Linear systems of ODEs

- §3.2: sys linear ODEs
  - §3.2 (p.219): 2cde,6,8,12,13,20,24ac,25ac
- §3.3: props of systems
  - §3.3 (p.232): 2,6,8,10,11,14

week 6 - Solving homogeneous linear systems of ODEs

- §3.4: Linear Indep Vectors
  - §3.4 (p.241): 1,2,3,4,5,7,8,11,12,15
- §3.5: Eigen-values & -vectors
  - §3.5 (p.254): 1,4,5,7,10,12,16,18
- §3.6: Row Reduction (1)
  - §3.6 (p.265): 1,3,4,6,8,11,13

week 7 - Solving homogeneous linear systems of ODEs

- §3.6: Row Reduction (2)
  - §3.6 (p.265): 14,17,18,19,20ac,21a
- §3.7: Real Eigenvalues
  - §3.7 (p.275): 1,4,6,9,11,13
- §3.8: Complex Eigenvalues

- §3.8 (p.284): 1,3,4,6,12

week 8 - conclusion of linear systems of ODEs

- §3.9: Double Eigenvals,Matrix Prod
  - §3.9 (p.295): 1abcdfg,4,5,9,13
- §3.11: Non-Homogeneous Sys
  - §3.11 (p.320): 4,5,8,13,16

week 9 - Laplace Transforms

- §5.2: Laplace Transf
  - §5.2 (p.421): 4,5,9,10,14,15
- §5.2: Inv Laplace Transf
  - §5.2 (p.421): 17,19,22,23,24 Typo: f(s) is the *inverse* transform of F(t)

week 10 - Laplace Transforms continued

- §5.3: Init Val Probs
  - §5.3 (p.432): 1,3,11,13,17,21
- §5.4: Further Props
  - §5.4 (p.441): 1,5,9,15,18,27,32
- §5.5: Funcs defn in pieces
  - §5.5 (p.452): 3,5,7,15,17,19

week 11 - Qualitative study of ODES

- §1.7: Graphing Sols
  - §1.7 (p.63): 1,3,4,6,8,9
- §1.8: Stability
  - §1.8 (p.71): 1,4,5,8,16,18
- §4.1: Interacting Populations
  - §4.1 (p.332): 1,2,3,4,5

week 12 - Qualitative study of ODES

- §4.2: Phase Portraits
  - §4.2 (p.348): 1,3,7,9
- §4.3: Linearization of Equilibria
  - §4.3 (p.364): 1,3,9,10,16

week 13 - Qualitative study of ODES

- §4.4: Constants of Motion
  - §4.4 (p.377): 1,2,7,9,10,12,13a