

MATH 3140-001 (Fall 2015)

Week by week guide

Week 1: 12.1-4: Review of dot, cross products, gradient vector; Double integrals, Iterated integrals, Integration over general regions, Integrals in polar coordinates

Suggested HW:

12.1: 1-5, 8, 11-13, 18

12.2: 3-10, 17-20, 23, 24, 28-31

12.3: 1-5, 8-10, 12, 17-22, 28-30, 47-50, 61, 65

Graded HW:

12.1: 1, 2, 3, 8, 12, 18

12.2: 7, 8, 9, 20, 31

12.3: 2, 3, 10, 12, 20, 22, 30, 49, 65

Week 2: 12.5-7: Applications, Surface area, Triple integrals

HW and quiz canceled.

Week 3: 12.8 Cylindrical/spherical coordinate integrals

Suggested HW:

12.4: 1-4, 10-14, 18-20, 23, 27-30, 36.

12.5: 5-9, 13, 23, 24, 25, 28, 29

12.6: 1-4, 13-14, 20, 22, 26.

12.7: 3-8, 14-18, 24, 27, 28, 30-32, 44, 50, 52.

Graded HW:

12.4: 3, 10, 18, 27.

12.5: 7, 13, 25.

12.6: 3, 14, 22.

12.7: 7, 8, 15, 27, 30.

Week 4: 12.9, 13.1, 13.2: Change of variables, Jacobians, Vector fields, Line integrals,

Graded HW:

12.8: 1-2, 9-10, 19-20, 35-36

12.9: 3-4, 7-8, 11-12, 23-24

Week 5: 13.3-6: Fundamental theorem of line integrals, Green's theorem, Curl and divergence, Surface integrals;

Graded HW:

13.2: 1, 2, 11, 20

13.3: 1, 4, 13, 17

13.4: 3, 5, 14, 17

Week 6: 13.7-8: Stokes' theorem, Divergence theorem **Midterm exam 1**

Graded HW:

13.5: 2, 10, 14, 30

13.6: 23-26, 41-42

13.7: 1-2, 5-6, 7-8, 17-18

13.8: 1-2, 5-6, 13-14, 19-20

Week 7: Applications of vector calculus to EM, fluids; Transport phenomena and the continuity equation, and 1st order PDE. **Switch to PDE text 12.1-2:** Heat/diffusion equation, conduction/transport in 1D

Graded HW:

Week 8: **Switch to PDE text 12.1:** Heat/diffusion equation, thermal conduction in 1D.

Graded HW:

Week 9: 12.2-5: Boundary Conditions, Equilibrium temperature, Derivation of heat equation in 2-3D using the divergence theorem

Graded HW:

12.2: 3,8,9

12.3: 2, 3

12.4: 1 a-h

Week 10: 13.1-3: Fourier coefficients, solving 1D heat equation with zero-endpoint temperature;

Graded HW:

12.5: 1, 5, 8, 12

13.2: 2

13.3: 2, 3, 5, 6, 7

Week 11: 13.4-5: 1D Heat equation with insulated ends, periodic ends, Laplace equation in a rectangle and disk 13.5, 14.1: Laplace cont., mean value theorem, maximum condition, uniqueness, net-zero boundary flux via divergence theorem, Fourier series **Midterm 2**

Graded HW:

13.4: 1(a, b only), 2, 6

13.5: 1(do only part b take $g(y) = \sin(\pi/H y)$; and part g), 2, 3, 6, 10, 29

Week 12: 4.10, 14.1-3: Orthogonal Vectors, Inner product, inner product space, Inner product on a function space, orthogonal projection onto a subspace with orthogonal basis, Convergence theorem, Sine and Cosine series.

Graded HW:

14.2: 1e, 2b use a computer to find the Fourier coefficients

14.3: 2c, 5c use a computer to find the Fourier coefficients

Week 13: 15.1-4: Derivation of wave equation in 1D, Boundary conditions, Solution with fixed ends

Graded HW:

15.2: 1, 2

15.3: 1

15.4: 1, 9, 10, 13

Week 14: 16.1-4: Heat equation on infinite 1D domain, Fourier transform pairs, Transforming the heat equation, Heat kernel

16.3: 5, 6, 11, 14

16.4: 3,5,8

Graded HW:

Week 15: Slack time and review