

Class Schedule

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0 Introduction

In the morning, we will go over the material listed below in a lecture format. Attention will be paid to topics that aren't usually included in the undergraduate curriculum but nonetheless appear on the GRE. In the afternoon, we will take practice tests and review them on alternating days. We'll go over in the most detail what the majority of the class has missed, indicated by big red bars on the scoring sheet below.

There will be a sign-in sheet at each session to make sure folks are actually coming.

1 Week 1

1.1 Monday

The material for this day will be drawn (mostly) from Math 31A. Main topics: limits, derivatives, implicit differentiation, related rates, the intermediate value theorem, the mean value theorem, optimisation, L'Hopital's rule, inverse functions and their derivatives, logarithms and exponential functions and their derivatives.

1.2 Tuesday

The material for this day will be drawn from Math 31B. Main topics: the integral, area between curves, volumes of revolution, the fundamental theorem of calculus, u -substitution, integration by parts, trigonometric integration, partial fractions, arc length and surface area, sequences and series, convergence tests, Taylor polynomials and power series, root and ratio tests.

1.3 Wednesday

The material for this day will be drawn from Math 32A. Main topics: basics on vectors in 3 dimensions, planes, parametric equations, arc length and speed, limits and continuity in multiple variables, partial derivatives, differentiability and tangent planes, gradient and directional derivatives, multivariable chain rule, optimisation.

1.4 Thursday

The material for this day will be drawn from Math 32B. Main topics: integration in two variables, triple integrals, polar coordinates, integration in polar coordinates, change of variables, vector fields, line integrals, conservative vector fields and parametrised surfaces, Green's theorem, Stokes' theorem, the divergence theorem.

1.5 Friday

The material for this day will be drawn from Math 33A and Math 115A. Main topics: systems of linear equations, determinants, invertibility, eigenvalues and eigenvectors, diagonalisation, basis and dimensions, linear transformations, inner products, Gram-Schmidt orthonormalisation. We will also cover some of the more abstruse but helpful facts from linear algebra that can be a huge time-saver.

2 Week 2

2.1 Monday

The material for this day will be drawn from Math 33B and (separately) Math 132. We will first discuss how to solve differential equations, mostly ODEs. Following, we will treat the small bit of complex analysis needed on the exam. This includes the residue theorem and the Cauchy-Riemann equations. This should be a relatively easy day.

2.2 Tuesday

The material for this day will be drawn from Math 110AB. There doesn't seem to be much Galois Theory on the exam, so we will not cover it. We will discuss the necessary group, ring, and field theory on the exam. ETS claims to have something of module theory on the exam, but I haven't seen it. We will also discuss the elementary number theory that appears, mostly modular arithmetic.

2.3 Wednesday

The material for this day will be drawn from Math 131AB and Math 121. Real analysis and topology make up a small but always-present section of the exam. The main analysis topics are: Lipschitz and uniform continuity of functions, absolute and uniform convergence of functions, suprema and infima. The main topology topics are: compactness, connectedness and path connectedness, continuous functions, metrics and metric spaces, separations axioms (e.g. Hausdorff), base of a topology.

2.4 Thursday

This will be a fairly miscellaneous day. The main topics are probability and combinatorics, including probability density functions, binomial distributions, and continuous random vari-

ables. We will also discuss the basic geometry that appears on the exam, such as the areas of triangles drawn around or inside circles and conic sections. Finally, we will touch on the elementary set theory, logic, graph theory, and algorithms that appear.

2.5 Friday

This is our wrap-up day, completely open for all questions.