

Topics List for Sophomore Exam

Calculus I

definitions and understanding the concept of the derivative
understanding the meaning of higher order derivatives
elementary differentiation techniques
 including the product rule; the chain rule; and implicit differentiation
optimization problems
related rates problems
simple Newton's Method's problems
computing a Taylor Polynomial for a function
u-substitutions and using the integral to compute area
the Fundamental Theorem of Calculus
Riemann Sums and the definition of an integral

Linear Algebra

gaussian elimination/row operations
nullspaces/kernels
rank of a matrix
vector spaces
basis,span,linear independence,linear combinations
determinants
eigenvalues/eigenvectors

Calculus II

volume integrals using an integral in one variable
integration by parts
partial fraction decomposition
improper integrals
dot and cross products
equations for lines and planes
directional derivatives and the gradient
find/classify a critical point for functions of two variables.
iterated integrals
finding volume using a double or triple integral
question concerning coordinate systems (possibly multiple)

Discrete Math

truth tables
inverses,converses, contrapositive
quantifiers
basic set theory -complements, intersections, unions
de Morgan's laws
induction
modular arithmetic
graph theory
computational complexity
pigeonhole principle