MATH 19-20-21 TOPICS LIST

Math 19. Here is a topic list, not necessarily arranged by order of coverage or by week.

(1) Definition and properties of functions, exponentials, logarithms, trigonometric functions and their inverses
(2) Definition of limits, computing limits, squeeze theorem, continuity, infinite limits and limits at infinity
(3) Definition and intuition for the derivative
(4) Computing derivatives, product rule, quotient rule, chain rule
(5) Derivatives of inverse functions, implicit differentiation (logarithmic differentiation if time/interest)
(6) Linear approximation
(7) Max/min problems, optimization, applications of derivatives
(8) L'Hopital's rule
(9) Related rates
(10) Curve sketching using limits and derivatives

Math 20. Here is a topic list, not necessarily arranged by order of coverage or by week.

(1) The definite integral as area under the curve
(2) Antiderivatives and indefinite integrals, Fundamental Theorem of Calculus
(3) Integration techniques: basic integration, substitution, integration by parts, using tables of integrals (partial fractions and/or trig substitution if time/interest)
(4) Applications of integration: area between curves, volumes of solids
(5) Introduction to differential equations: initial value problems, slope fields, separable equations
(6) Applications of differential equations and modeling, logistic equation
(7) Parametric equations, arc length of parametric curves

Math 21. Here is a topic list, not necessarily arranged by order of coverage or by week.

(1) Review of limits and integration techniques
(2) Improper integrals: unbounded interval (type 1) and bounded interval with asymptote (type 2); comparison tests for convergence
(3) Sequences, geometric series, general series
(4) Convergence tests for series: divergence test, integral test, comparison test, limit comparison test, ratio test, alternating series test, absolute convergence test
(5) Power series, radius/interval of convergence, differentiation/integration of power series
(6) Taylor polynomials, Taylor series (in particular, the series and radius of convergence for e^x, $\sin x$, $\cos x$, $\arctan x$, $\ln x$)
(7) Applications of Taylor series, error in Taylor polynomial approximations