BC CALCULUS EXAM TOPIC LIST

- Limits
  - 3 conditions to exist
  - left and right-handed limits
  - 3 conditions for continuity
  - limits at infinity (HAs)
  - limits that approach infinity (VAs)
  - comparative growth rates
  - L'Hopital's rule
- Derivatives
  - 3 conditions for differentiability
  - Power, product, quotient, chain rules
  - Average vs instantaneous rates of change
  - Approximating from a table
  - Write tangent line equations/linear approximation
  - Implicit differentiation
  - Related rates
  - Derivative of an inverse function
  - Derivatives of $\log_a x$, $\ln x$, a^x, e^x, all trig functions, all inverse trig functions
  - Finding slopes based on parametric and polar functions
- Curve Sketching
  - Increasing, decreasing, relative extrema and all because statements
  - Concave up, concave down, points of inflection and all because statements
  - 2^{nd} derivative test for relative extrema
  - questions involving graph of f '(x)
  - absolute extrema on closed intervals
  - optimization
- PVA
  - Relationship between position, velocity, acceleration
  - Finding horizontal/vertical components of each of these
  - Speed (magnitude of velocity vector) – know when increasing/decreasing
  - Distance vs displacement
- Theorems
  - IVT, EVT, MVT
  - FFTC, SFTC
- Integrals
  - Riemann sums – left, right, midpoint
  - trapezoid approximations
  - average value formula
  - U-substitution – both with indefinite and definite integrals
  - Integration by parts
  - Partial fractions
  - Trig substitution
  - Trig integrals including power reduction identities
  - Improper integrals

- Differential Equations
  - Writing based on exponential growth/decay problems
  - Slope fields – graphing, matching to a differential equation
  - Solving
  - Domain of solution
  - Euler's method
  - Logistic models and differential equations
- Area/Volume
  - Area (dx or dy)
  - Area of polar regions
  - Volume using disc, washer, cross section, or shell methods
  - Arc length – functions, parametrics, polar graphs
- Series
  - Using geometric series to rewrite decimals
  - Converting geometric sums to series notation and vice versa
  - Convergence tests
  - Interval and radius of convergence
  - Alternating series with error bound
  - Taylor polynomials and series
  - Maclaurin series
  - Derivatives and integrals of series
  - Replacing variables of series
  - Lagrange error bound for Taylor series

COMMON FREE-RESPONSE TOPICS

- Area (regular and polar)/volume/arc length
- PVA (usually with vectors/parametrics)
- Differential equations/slope fields
- Antiderivative word problems (rate going in/rate coming out)
- Curve sketching – often with SFTC
- Taylor series
- Riemann sum/trap/average value – usually with a table
- Once in a while – related rates