**AP Calculus Study Guide: Indefinite Integrals Test**

About 30 questions; some multiple choice, some short answer; no calculator and yes calculator sections

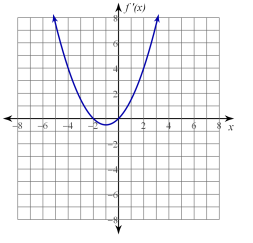
* Evaluate the indefinite integral for the following function types:
  + Polynomial with integer exponents: ;
  + Function with radicals that can be made into a polynomial
  + Rational function that can be made into a polynomial
  + Rational function that is actually an ln problem:
  + Trigonometric functions
  + Reverse chain rule involving polynomials ;
  + Reverse chain rule involving e and ln(x) ;
  + Reverse chain rule involving trigonometric functions:
  + U-substitution for when reverse chain rule fails:
* Finding C: given a derivative and an initial condition, find the particular solution with a value for C.

Ex: A particle moves along the x-axis such that its velocity is given by. At time t=1, the particle’s position is x(1) = 5. Find *x(t)*.

**Review topics:**

* Related rates without a variable substitution: (will be provided geometry formulas if they’re not obvious)

Ex: A pebble falls in a pond and causes a circular ripple. The radius of the ripple is increasing by 1cm per second. At the instant the circumference is equal to 12pi, how fast is the area changing?

* Finding limits at a discontinuity without a calculator
* Using implicit differentiation to find dy/dx:
  + Given that x2 + xy + y2 = 1 Show that dy/dx is
* Determining intervals of increasing/decreasing and concavity given a graph of F’

Given the graph of F’, when is F increasing? When is it concave down?

* Finding and justifying extrema
  + Given f(x) = , find the points that are local maximums. Justify your answer.
* Mean Value Theorem: find the value of c that satisfies the MVT for a given differentiable function
  + Let *f* be the function given by  Find the number *c* that satisfies the conclusion of the Mean Value Theorem for *f* on the closed interval [1, 3].