Advanced Placement Calculus AB Name ______________________________

Copy the original problem.
Convince *me* that **you** understand the concept.
(Remember: 3 decimal places!!)

Per ________ Date ______________________

CHAPTER #7 & 8

I The definite integral of a function *f* over an interval [a, b] is denoted by $\int f(x)\ dx$ and defined as follows: $\int f(x)\ dx = \lim\limits_{mesh \to 0} f\left(X_i\right)\left(x_i - x_{i-1}\right)$.

Describe each of the following ***and*** its purpose: (15 pts tot)

a) X_i b) $x_i - x_{i-1}$ c) $f\left(X_i\right)$ d) $f\left(X_i\right)\left(x_i - x_{i-1}\right)$ e) mesh

II A racing car achieves the following speeds (in miles per hour) during the first five seconds of a race. Use appropriate left and right sums to approximate the distance the driver travels during the first five seconds. By how many feet do they differ? (20 points)

seconds	1	2	3	4	5
mph	16	40	62	82	100

III For each of the following, explain why we cannot evaluate the definite integral. (5 pts ea)

a) $\int_0^1 \frac{1}{x}\ dx$ b) $\int_0^\infty x\ dx$ c) $\int_0^\pi \tan x\ dx$ d) $\int_{-1}^2 \sqrt{x}\ dx$

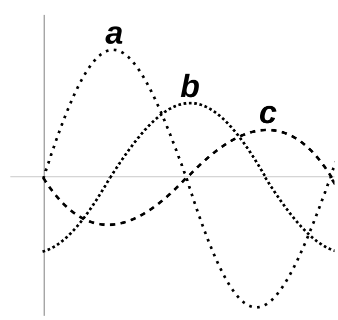
IV A function f is *piecewise continuous* on [a, b] if it is continuous except, possibly, for a finite set of points at which it has a discontinuity. It can be shown that if f is *piecewise continuous* on [a, b], then $\int_a^b f(x)\ dx$ exists. Let $f(x) = \begin{cases} x^2 & ; 0 \le x \le 2 \\ x & ; 2 < x \le 5 \end{cases}$ (15 pts tot)

a) Sketch the graph of f.
b) Write the definite integrals needed to describe the area of the region bounded by the graph of f and the x-axis between $x = 0$ and $x = 5$.
c) Find thearea described.

V Assume f is a continuous function and that $\int_0^x f(t)\ dt = \frac{2x}{4 + x^2}$ (15 pts tot)

a) Determine $f(0)$ b) Find the zeros of f, if any.

VI The figure shows the graphs of f, f', and $\int_0^x f(t)\ dt$. Identify each graph and explain your choices. (15 pts)



EXTRA CREDIT 5 pts

Evaluate: $\lim\limits_{x \to 3}\left(\frac{1}{x - 3}\int_3^x \frac{\sin t}{t}\ dt\right)$